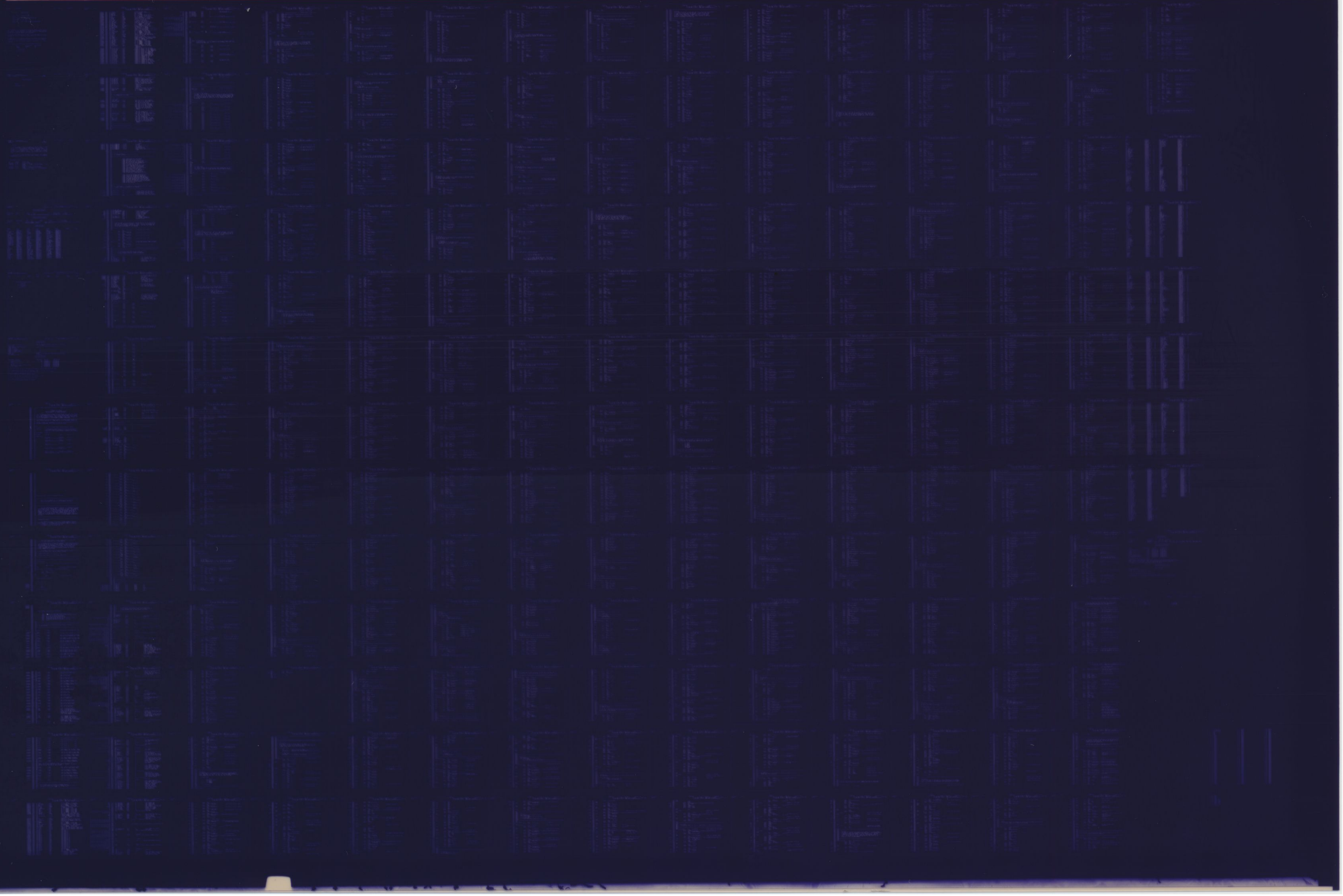
ENKAB·1.5

VAX/11730 8085 BSED EP·ENKAB·DL·1.5
MICROMONITR FOR CDR FICHE 01 OF 01

JAN 1985
COPYRIGHT© 82·84
MADE IN USA



IDENTIFICATION

Product code: ZZ-ENKAB VERSION 1.5

Product name: VAX-11/730 CRD MICRO-MONITOR

Product date: 27-AUG-1982

Maintainer: BASE SYSTEMS DIAGNOSTIC ENGINEERING

The information in this document is subject to change without notice and should not be construed as a commitment by Digital Equipment Corporation. Digital Equipment Corporation assumes no responsibility for any errors that may appear in this document.

The software described in this document is furnished under a license and may be used or copied only in accordance with the terms of such license.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by Digital or its affiliated companies.

Copyright (c) 1982 by Digital Equipment Corporation. All Rights Reserved.

The following are trademarks of Digital Equipment Corporation.

DEC
DECUS
UNIBUS
DECsystem-10
MASSBUS
VAX
DECSYSTEM-20
PDP
VMS

```
 -------------
|d|i|g|i|t|a|l|
 -------------
```

Table of Contents

1.0 ABSTRACT 3
2.0 MAINTENANCE HISTORY 3

1 ABSTRACT

This program is the micro diagnostic monitor that is used during VAX-11/730 Customer Runable Diagnostics AUTO mode. It is similar to the standard Micmon, except that contained within the program is a pre-determined string of commands to execute particular micro diagnostic tests. This program also contains special progress and error messages that are displayed to the CRD user.

For further information about the program, and for complete documentation concering CRD AUTO mode, consult the ENSAB.DOC documentation file.

2 MAINTENANCE HISTORY

DATE	VERSION	DESCRIPTION
6-JUL-82	01.00	Initial release.
27-AUG-82	01.10	Changes for IDC Part II Version 2.0
23-MAY-83	01.20	Changes to support LCN and KERNEL 11/730 systems.
25-JUL-83	01.30	Changes to support LCN 11/725 name.
16-JAN-84	01.40	Changes for systems having TSU05 as drive 1
14-JUN-84	01.50	Changes to the Title. It will now be known as microdiagnostic section.

```
                                        +---------------------------+
                                        ! Object Module Synopsis !
                                        +---------------------------+

Module Name   Ident             Bytes     File                                      Creation Date       Creator
-----------   -----             -----     -----                                     -------------       -------
.MAIN.        0                  8189 DRB0:[BALL.ENKAB.RELEASE]ENKAB.OBJ;1 15-JUN-1984 12:22  VAX-11 Macro V03-01

                                        +----------------------------+
                                        ! Program Section Synopsis !
                                        +----------------------------+

Psect Name    Module Name       Base     End               Length            Align          Attributes
----------    -----------       ----     ---               ------            -----          ----------
MICMON                          00004C00 00006BFC 00001FFD (      8189.) BYTE 0 NOPIC,USR,CON,REL,LCL,NOSHR,  EXE,  RD,  WRT,NOVEC
              .MAIN.            00004C00 00006BFC 00001FFD (      8189.) BYTE 0

                                        +---------------------+
                                        ! Symbols By Name !
                                        +---------------------+

Symbol          Value           Symbol          Value           Symbol          Value           Symbol          Value
------          -----           ------          -----           ------          -----           ------          -----
APT             00004C38-R      GCVECT          00004129        READ_LS         00004D02-R
APT_PASS_CNT    00004C18-R      HEX_3           00000003        READ_WCS        00004CE7-R
CC_ADDR         000000FE        HEX_BUF         00004C5B-R      SET_FOR_CONT    00004D2C-R
CLEAR_CPU_ATT   00004D2F-R      INC_WORD        00004D08-R      SHIFTER         00004CE1-R
CNTLC_TYPED     00004C39-R      LD_UPC          00004D17-R      SHIFTER1        00004D32-R
COMPARE         00004CCF-R      LF              0000000A        SHIFT_L_2901    00004CF6-R
CONTINUE        00004C3A-R      LOAD_CSR        00004CF0-R      SHIFT_PNT       00004C68-R
CON_ADD_DAT     00004C3B-R      LOAD_UPC        00004CF3-R      SHIFT_R_2901    00004CF9-R
CON_BEGIN_TEST  00004D23-R      MAKE_XD         00004D0B-R      SKIP_TEST       00004C6A-R
CON_ERROR       00004D20-R      MCPU_A          00004D40-R      SPACE           00004CDB-R
CON_ERR_NUM     00004C3F-R      MICRO_STEP_CPU  00004D38-R      UPC_VALUE       00004CC2-R
CON_EXP_ADD     00004C44-R      MOVER           00004CD2-R      WCS_ADDRESS     00004C6C-R
CON_EXP_DAT     00004C40-R      MOVER_3         00004D1A-R      WCS_BAD_PARITY  00004C6E-R
CON_MOD_DAT     00004C46-R      MOVER_4         00004D11-R      WCS_READ        00004D26-R
CON_MSK_DAT     00004C4B-R      MSK_ERROR       00004D1D-R      WCS_SHIFT       00004C6B-R
CON_REC_ADD     00004C53-R      MWCS_A          00004D3B-R      WCS_VALUE       00004CB4-R
CON_REC_DAT     00004C4F-R      NA_EXP_REC      00004C5F-R      WCS_VAL_SHIFT   00004CB3-R
CR              0000000D        NA_OTHER        00004C60-R      WCS_WRITE       00004D29-R
CRLF            00004CDE-R      NOP_CSR         00004CE4-R      WRITE_DATA_32   00004CFF-R
CSR_SHIFT       00004CB7-R      NOP_INST        00004C72-R      WRITE_LS        00004D05-R
CSR_VALUE       00004CB8-R      OS_ADD          0000007C        WRITE_TAB_PNT   00004C6F-R
DATA0           00004CA9-R      OVERLAY_RAM     00004C03-R      WRITE_WCS       00004CEA-R
DATA1           00004CAA-R      OVERLAY_WCS     00004C06-R      XD_ADDRS        00004C71-R
DATA2           00004CAB-R      PARITY_JUMP     00004C61-R      X_CLR_PAGE      00004C7D-R
DATA3           00004CAC-R      PARITY_ON       00004C64-R      X_CLR_WR0       00004CA1-R
DATA_SHIFT      00004CA8-R      PERFORM_CSR     00004CED-R      X_COM_WR0       00004CA5-R
DECR_WORD       00004D35-R      POWER_BRANCH    00004C65-R      X_MOV_WRWR      00004C9E-R
DOLOOP          00004C55-R      PRINT           00004CD5-R      X_ROT_L         00004C79-R
EOS_FLG         00004C56-R      PRINT_HEX       00004CD8-R      X_SET_PAGE      00004C81-R
ERROR_CON       00004C57-R      PRINT_HEX_1     00004D14-R      X_SHIFT_L       00004C75-R
FLAGS           00004C5A-R      PRINT_STRING    00004D0E-R      X_SHIFT_R       C0004C85-R
F_WORD          00004C58-R      READ_DATA_32    00004CFC-R
```

```
Symbol          Value           Symbol          Value           Symbol          Value           Symbol          Value
------          -----           ------          -----           ------          -----           ------          -----


        Key for special characters above:
                +--------------------+
                ! *  - Undefined     !
                ! U  - Universal     !
                ! R  - Relocatable   !
                ! X  - External      !
                +--------------------+
                                         +------------------+
                                         ! Image Synopsis !
                                         +------------------+

Virtual memory allocated:                00004C00 00006BFF 00002000 (8192. bytes, 16. pages)
Stack size:                                     0. pages
Image binary virtual block limits:              1.        16. (    16. blocks)
Image name and identification:           ENKAB 0
Number of files:                                1.
Number of modules:                              1.
Number of program sections:                     2.
Number of global symbols:                      95.
Number of image sections:                       1.
Image type:                              SYSTEM.
Map format:                              DEFAULT in file DRB0:[BALL.ENKAB.RELEASE]ENKAB.MAP;2
Estimated map length:                    14. blocks
                                       +----------------------+
                                       ! Link Run Statistics !
                                       +----------------------+

Performance Indicators                   Page Faults   CPU Time        Elapsed Time
----------------------                   -----------   --------        ------------
    Command processing:                          102   00:00:00.18     00:00:00.32
    Pass 1:                                       33   00:00:00.14     00:00:00.65
    Allocation/Relocation:                         6   00:00:00.13     00:00:00.33
    Pass 2:                                       16   00:00:02.04     00:00:06.68
    Map data after object module synopsis:         9   00:00:00.26     00:00:00.88
    Symbol table output:                           0   00:00:00.01     00:00:00.20
Total run values:                                166   00:00:02.76     00:00:09.06

Using a working set limited to 500 pages and 30 pages of data storage (excluding image)

Total number object records read (both passes):   132
    of which 0 were in libraries and 2 were DEBUG data records containing 39 bytes

Number of modules extracted explicitly            = 0
    with 0 extracted to resolve undefined symbols

0 library searches were for symbols not in the library searched

A total of 0 global symbol table records was written

LIN/SYST=%X4C00/MAP=ENKAB/EXE=ENKAB.EXE ENKAB.OBJ
```

```
0000      2 .TITLE  ''ENKAB  8085 based micro-monitor for NEBULA CRD Rev 1.5''
0000      3 ;
0000      4 ;
0000      5 ;                        COPYRIGHT (c) 1982 BY
0000      6 ;              DIGITAL EQUIPMENT CORPORATION, MAYNARD,
0000      7 ;               MASSACHUSETTS.  ALL RIGHTS RESERVED.
0000      8 ;
0000      9 ; THIS SOFTWARE IS FURNISHED UNDER A LICENSE AND MAY  BE  USED  AND  COPIED
0000     10 ; ONLY  IN ACCORDANCE WITH THE TERMS OF SUCH LICENSE AND WITH THE INCLUSION
0000     11 ; OF THE ABOVE COPYRIGHT NOTICE.  THIS SOFTWARE OR ANY OTHER COPIES THEREOF
0000     12 ; MAY NOT BE PROVIDED OR OTHERWISE MADE AVAILABLE TO ANY OTHER  PERSON.  NO
0000     13 ; TITLE TO AND OWNERSHIP OF THE SOFTWARE IS HEREBY TRANSFERRED.
0000     14 ;
0000     15 ; THE INFORMATION IN THIS SOFTWARE IS SUBJECT TO CHANGE WITHOUT NOTICE, AND
0000     16 ; SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION.
0000     17 ;
0000     18 ; DIGITAL  ASSUMES  NO  RESPONSIBILITY  FOR  THE  USE OR RELIABILITY OF ITS
0000     19 ; SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL.
0000     20 ;
0000     21
0000     22 ;++
0000     23 ; FACILITY:      VAX-11/730 CUSTOMER RUNABLE MICRO-DIAGNOSTIC MONITOR
0000     24 ;
0000     25 ; ABSTRACT:      This 8085 based program monitors and controls the execution
0000     26 ;                of both 8085 based micro-diagnostics and WCS based micro-
0000     27 ;                diagnostics in the Customer Runable Diagnostics environment.
0000     28 ;
0000     29 ; ENVIRONMENT:   Standalone
0000     30 ;
0000     31 ; AUTHOR:        David Mayo                 6-JUL-82        VERSION 1.0
0000     32 ;
0000     33 ; MODIFIED BY:
0000     34 ;                David Mayo                 27-AUG-82       Version 1.1
0000     35 ;                Changes for IDC Part II version 2.0
0000     36 ;
0000     37 ;                Peter Green                3-MAR-83        VERSION 1.2
0000     38 ;                Changes for LCN and Kernel systems.
0000     39 ;
0000     40 ;
0000     41 ;                Peter Green                5-JUL-83        VERSION 1.3
0000     42 ;                Changes for LCN syntax.
0000     43 ;
0000     44 ;
0000     45 ;                Darryl L. Ball             28-NOV-83       VERSION 1.4
0000     46 ;                Changes for TS05 system configurations.
0000     47 ;
0000     48 ;
0000     49 ;                Darryl L. Ball             14-Jun-84       VERSION 1.5
0000     50 ;                Added a new header for distinction between the micro
0000     51 ;                and macro portions of CRD.
0000     52 ;
0000     53 ;--
0000     59
0000     60
0000     61
0000     62
0000     63
```

```
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000
0000     ;8085 SOURCE CODE   CRD MICRO DIAGNOSTIC MONITOR
0000
0000
0000     ;****************************************************************************
0000     ;
0000     ;        NOTE:  THE LAST ADDRESS OF THIS PROGRAM MUST NOT EXCEED 6FFF.  THE
0000     ;        8085 MICRO-DIAGNOSTIC OVERLAYS LOAD AT ADDRESS 7000 HEX!!!
0000     ;
0000     ;****************************************************************************
0000
0000
0000     ;****************************************************************************
0000     ;
0000     ;        LIKE THE STANDARD MICRO-DIAGNOSTIC MONITOR, THIS PROGRAM WAS DESIGNED
0000     ;  USING PROGRAM DESIGN LANGUAGE (PDL).  SINCE PDL IS A HIGH LEVEL LANGUAGE
0000     ;  THE DECISION TO WRITE THIS MONITOR USING MACROS WAS MADE.  THE MACROS USE
0000     ;  MANY OF THE REGISTERS, SO USE OF REGISTERS FOR PASSING PARAMETERS IS
0000     ;  DANGEROUS AT BEST.  ALSO THERE ARE DIFFERENCES BETWEEN THE PDL AND THE
0000     ;  PROGRAM.  PDL IS MEANT AS A DESIGNERS LANGUAGE AND IS USED TO PASS
0000     ;  INFORMATION TO THE IMPLIMENTOR.  THE USE OF THE MACROS HELPS KEEP THE TWO
0000     ;  SIMILAR, BUT IMPLEMENTATION IN A SLIGHTLY DIFFERENT MANNER IS SOMETIMES
0000     ;  NECESSARY.
0000     ;
0000     ;****************************************************************************
0000
0000     ;****************************************************************************
0000     ;  IMPLEMENTATION NOTES:
0000     ;
0000     ;        THIS PROGRAM IS CALLED "CRD MICMON" (CUSTOMER RUNABLE DIAGNOSTICS
0000     ;  MICRO MONITOR).  CRD MICMON IS USED TO RUN MICRO DIAGNOSTICS FOR THE
0000     ;  MICRO DIAGNOSTICS.  CRD MICMON RUNS TWO DIFFERENT FORMS OF DIAGNOSTICS:
0000     ;        A) DIAGNOSTICS WRITTEN IN CPU MICRO CODE.
0000     ;        B) DIAGNOSTICS WRITTEN IN 8085 CODE.
```

```
                    0000   ;
                    0000   ;       CRD MICMON PASSES CONTROL TO 8085 DIAGNOSTICS BY CALLING THEM
                    0000   ;  AS IF THEY WERE SUBROUTINES OF THE MICRO MONITOR.
                    0000   ;
                    0000   ;       CRD MICMON CAUSES CPU MICRO CODE DIAGNOSTICS TO BE EXECUTED. THIS IS
                    0000   ;  DONE BY STARTING THE CPU AT SPECIFIC ADDRESSES. (THESE VARIOUS ADDRESSES
                    0000   ;  ARE CONTAINED IN THE CONSTANTS LISTED IN THE CONSTANT SECTION) THE CPU
                    0000   ;  MICRO DIAGNOSTICS RUN CONCURRENT TO THE 8085.  THE CPU MICRO CODED
                    0000   ;  DIAGNOSTIC COMMUNICATES WITH MICMON BY SETTING THE CPU ATTENTION
                    0000   ;  SIGNAL (HARDWARE) AND CONVEYING IT'S MESSAGE THROUGH THE USE OF A
                    0000   ;  32 BIT COMMAND AND STATUS WORD.
                    0000   ;
                    0000   ;       CRD MICMON ISSUES A SET OF PRE-DETERMINED COMMANDS AUTOMATICALLY,
                    0000   ;  RATHER THAN TAKING INPUT FROM THE CONSOLE TERMINAL.
                    0000   ;
                    0000   ;  VARIABLE NAMES ENDING IN _A ARE ASCII TEXT
                    0000   ;
                    0000   ;  VARIABLE NAMES ENDING IN _R ARE GLOBAL SUBROUTINES
                    0000   ;
                    0000   ;*****************************************************************************
                    0000
                    0000
                    0000   ;*****************************************************************************
                    0000   ;
                    0000   ; DATA SECTION
                    0000   ;
                    0000   ;*****************************************************************************
                    0000
            00000000       .PSECT  MICMON
                    0000
       00000000     0000   HEAD            = 0                             ;CALCULATE NO OFFSET IN ASSEMBLY
                    0000
                    0000   ;ENTRY POINT TO THE PROGRAM IS FIRST ADDRESS OF OVERLAY
                    0000
                    0000                   JMP     START_UP
             C3     0000            .BYTE  ^0303
          1CD2'     0001            .WORD  <START_UP-HEAD>
                    0003
                    0003
                    0003                   EQUATE                          ;REGISTER EQUATE MACRO
                    0003            .LIST  ME
                    0003   ;
                    0003   ; 8085 REGISTER DEFINITIONS
                    0003   ;
                    0003
                    0003   ;
                    0003   ; REGISTER PAIRS
                    0003   ;
       00000000     0003            B       =       0
       00000002     0003            D       =       2
       00000004     0003            H       =       4
       00000006     0003            $SP     =       6
       00000006     0003            $PSW    =       6
                    0003   ;
                    0003   ; NON REGISTER PAIRS
                    0003   ;
       00000001     0003            C       =       1
```

```
00000003  0003              E       =       3
00000005  0003              L       =       5
00000006  0003              M       =       6
00000007  0003              A       =       7
          0003
          0003        ;
          0003        ; 8085 ASSEMBLY LANGUAGE DEFINITION MACRO'S
          0003        ;
          0003
          0003              .MCALL  MOV,MVI,LXI,STAX,LDAX,STA,LDA,SHLD,LHLD,XCHG
          0003              .MCALL  PUSH,POP,XTHL,SPHL,JMP,JC,JNC,JZ,JNZ,JP,JM,JPE,JPO,PCHL
          0003              .MCALL  CALL,CC,CNC,CZ,CNZ,CP,CM,CPE,CPO
          0003              .MCALL  RET,RC,RNC,RZ,RNZ,RP,RM,RPE,RPO,RST
          0003              .MCALL  INR,DCR,INX,DCX,ADD,ADC,ADI,ACI,DAD,SUB,SBB,SUI,SBI
          0003              .MCALL  ANA,XRA,ORA,CMP,ADI,XRI,ORI,CPI
          0003              .MCALL  RLC,RRC,RAL,RAR,CMA,STC,CMC,NOP,HLT,RIM,SIM
          0003              .MCALL  IN,OUT
          0003    159
          0003    160
          0003    161 ;***************************************************************************
          0003    162 ;
          0003    163 ;  THE FOLLOWING BLOCK OF MACROS DEFINE THE HARDWARE INTERFACE TO
          0003    164 ;  THE 8085 SYSTEM.
          0003    165 ;
          0003    166 ;***************************************************************************
          0003    167
          0003    168
00000000  0003    169 UPC14A          =<^X00>                 ;(RO) UPC BIT 14 ASSERTED HIGH <MSB>
          0003    170
00000001  0003    171 MISC2           =<^X01>
00000001  0003    172 BOOTF           =<^X01>                 ;(RO) BOOT FLAG. ASSERTED LOW. <LSB>
          0003    173
00000002  0003    174 DCLO            =<^X02>                 ;(RO) DC LOW FLAG ASSERTED HIGH<MSB>
00000002  0003    175 HLTFLG          =<^X02>                 ;(RO) HALT FLAG ASSERTED LOW   <LSB>
          0003    176
00000003  0003    177 READJ1          =<^X03>                 ;(RO) JUMPER J1 FLAG ASS. HIGH <MSB>
00000003  0003    178 ALLOWP          =<^X03>                 ;(RO) ENABLE CONTROL P ASS LOW <LSB>
          0003    179
00000004  0003    180 READJ2          =<^X04>                 ;(RO) BIT 07 EQUALS J2 <MSB>
00000004  0003    181 APTFLG          =<^X04>                 ;(RO) APT PRESENT FLAG <LSB>
          0003    182
00000005  0003    183 AUTO            =<^X05>                 ;(RO) AUTO TEST FLAG ASS LOW <LSB>
          0003    184
00000006  0003    185 REMOTE          =<^X06>                 ;(RO) REMOTE FLAG ASS LOW <LSB>
          0003    186
00000007  0003    187 OKV15           =<^X07>                 ;(RO) 15 VOLTS OK FLAG ASS LOW <MSB>
00000007  0003    188 BOOTEN          =<^X07>                 ;(RO) BOOT ENABLE FLAG ASS LOW <LSB>
          0003    189
00000008  0003    190 WCSB0           =<^X08>                 ;(WO) WCS WRITE DATA REG, BYTE 0
00000009  0003    191 WCSB1           =<^X09>                 ;(WO) WCS WRITE DATA REG, BYTE 1
0000000A  0003    192 WCSB2           =<^X0A>                 ;(WO) WCS WRITE DATA REG, BYTE 2
          0003    193
0000001C  0003    194 ITDB            =<^X1C>                 ;(R/W) TIMER DATA REGISTER
0000001D  0003    195 ITCSR           =<^X1D>                 ;(R/W) TIMER STATUS REGISTER
          0003    196
00000020  0003    197 CLRCLK          =<^X20>                 ;(WO) CLEAR CPU CLOCK RUN
00000021  0003    198 SETCLK          =<^X21>                 ;(WO) SET CPU CLOCK RUN
```

```
                           0003     199
                 00000022  0003     200 CLRSS             =<^X22>                    ;(WO) CLEAR CLOCK SINGLE STEP
                 00000023  0003     201 SETSS             =<^X23>                    ;(WO) SET CLOCK SINGLE STEP
                           0003     202
                 00000024  0003     203 CLRCSK            =<^X24>                    ;(WO) CLEAR CSR CLOCK
                 00000025  0003     204 SETCSK            =<^X25>                    ;(WO) SET CSR CLOCK
                           0003     205
                 00000026  0003     206 CLRUPK            =<^X26>                    ;(WO) CLEAR THE UPC CLOCK
                 00000027  0003     207 SETUPK            =<^X27>                    ;(WO) SET THE UPC CLOCK
                           0003     208
                 00000028  0003     209 SETMCI            =<^X28>                    ;(WO) SET MEMORY CONTROL INIT
                 00000029  0003     210 CLRMCI            =<^X29>                    ;(WO) CLEAR MEMORY CONTROL INIT
                           0003     211
                 0000002A  0003     212 SETMCK            =<^X2A>                    ;(WO) SET MEMORY CONTROL CLOCK
                 0000002B  0003     213 CLRMCK            =<^X2B>                    ;(WO) CLEAR MEMORY CONTROL CLOCK
                           0003     214
                 0000002C  0003     215 CLRTMR            =<^X2C>                    ;(WO) STOP TIMER
                 0000002D  0003     216 SETTMR            =<^X2D>                    ;(WO) START TIMER COUNTING
                           0003     217
                 0000002E  0003     218 CLRBSY            =<^X2E>                    ;(WO) CLEAR UNIBUS BUS BUSY
                 0000002F  0003     219 SETBSY            =<^X2F>                    ;(WO) SET UNIBUS BUS BUSY
                           0003     220
                 00000030  0003     221 SETDCL            =<^X30>                    ;(WO) SET DC LOW
                 00000031  0003     222 CLRDCL            =<^X31>                    ;(WO) CLEAR DC LOW
                           0003     223
                 00000032  0003     224 SETACL            =<^X32>                    ;(WO) SET AC LOW
                 00000033  0003     225 CLRACL            =<^X33>                    ;(WO) CLEAR AC LOW
                           0003     226
                 00000034  0003     227 INITL             =<^X34>                    ;(WO) CLEAR UNIBUS INIT
                 00000035  0003     228 INITH             =<^X35>                    ;(WO) SET UNIBUS INIT
                           0003     229
                 00000036  0003     230 CLRWCK            =<^X36>                    ;(WO) CLEAR WCS WRITE CLOCK
                 00000037  0003     231 SETWCK            =<^X37>                    ;(WO) SET WCS WRITE CLOCK
                           0003     232
                 00000038  0003     233 CLRCSR            =<^X38>                    ;(WO) CLEAR CSR SERIAL INPUT
                 00000039  0003     234 SETCSR            =<^X39>                    ;(WO) SET CSR SERIAL INPUT
                           0003     235
                 0000003C  0003     236 CLRLIT            =<^X3C>                    ;(WO) CLEAR THE RUN LIGHT
                 0000003D  0003     237 SETLIT            =<^X3D>                    ;(WO) SET THE RUN LIGHT
                           0003     238
                 00000044  0003     239 TUDB              =<^X44>                    ;(R/W) TU-58 DATA BUFFER
                 00000045  0003     240 TUSR              =<^X45>                    ;(RO)  TU-58 STATUS REGISTER
                 00000046  0003     241 TUMODE            =<^X46>                    ;(R/W) TU-58 MODE REGISTER 1 + 2
                           0003     242                                              ;FIRST ACCESS GET MR1,SECOND GETS MR2
                           0003     243                                              ;READING THE CR FORCES THE INTERNAL
                           0003     244                                              ;POINTER BACK TO MR1
                 00000047  0003     245 TUCR              =<^X47>                    ;(R/W) TU-58 COMMAND REGISTER
                           0003     246
                 00000048  0003     247 TTDB              =<^X48>                    ;(R/W) TERMINAL DATA BUFFER
                 00000049  0003     248 TTSR              =<^X49>                    ;(RO)  TERMINAL STATUS REGISTER
                 0000004A  0003     249 TTMODE            =<^X4A>                    ;(R/W) TERMINAL MODE REGISTER 1 + 2
                           0003     250                                              ;FIRST ACCESS GET MR1,SECOND GETS MR2
                           0003     251                                              ;READING THE CR FORCES THE INTERNAL
                           0003     252                                              ;POINTER BACK TO MR1
                 0000004B  0003     253 TTCR              =<^X4B>                    ;(R/W) TERMINAL COMMAND REGISTER
                           0003     254
                 00000080  0003     255 READ              =<^X80>                    ;(RO) CONSOLE READ REGISTER
```

```
                    0003     256
          00000082  0003     257 CPUACK          =<^X82>                 ;(RO) ACKNOWLEDGE FROM CPU <LSB>
                    0003     258
          00000083  0003     259 CPATTN          =<^X83>                 ;(RO) ATTENTION FROM CPU <LSB>
                    0003     260
          00000084  0003     261 UPC14           =<^X84>                 ;(RO) UPC BIT 14        <LSB>
                    0003     262
          00000085  0003     263 CSR07           =<^X85>                 ;(RO) CSR BIT 7         <LSB>
                    0003     264
          00000086  0003     265 CSR15           =<^X86>                 ;(RO) CSR BIT 15        <LSB>
                    0003     266
          00000087  0003     267 CSR23           =<^X87>                 ;(RO) CSR BIT 23        <LSB>
                    0003     268
          000000A0  0003     269 ENBPAR          =<^XA0>                 ;(WO) ENABLE STALL ON PARITY ERROR
          000000A1  0003     270 DISPAR          =<^XA1>                 ;(WO) DISABLE STALL ON PARITY ERROR
                    0003     271
          000000A2  0003     272 VSHIFT          =<^XA2>                 ;(WO) SET THE V-BUS TO SHIFT MODE
          000000A3  0003     273 VNORML          =<^XA3>                 ;(WO) SET THE V-BUS TO NORMAL MODE
                    0003     274
          000000A4  0003     275 SETTIM          =<^XA4>                 ;(WO) SET INTERVAL TIMER INTERRUPT
          000000A5  0003     276 CLRTIM          =<^XA5>                 ;(WO) CLEAR INTERVAL TIMER INTRPT.
                    0003     277
          000000A6  0003     278 ENBMEM          =<^XA6>                 ;(WO) ENABLE MEMORY REFERENCES
          000000A7  0003     279 DISMEM          =<^XA7>                 ;(WO) DISABLE MEMORY REFERENCES
                    0003     280
          000000A8  0003     281 SETACK          =<^XA8>                 ;(WO) SET CONSOLE ACKNOWLEDGE
          000000A9  0003     282 CLRACK          =<^XA9>                 ;(WO) CLEAR CONSOLE ACKNOWLEDGE
                    0003     283
                    0003     284 ;NOTE:  THE CONSOLE ACKNOWLEDGE SIGNAL IS ALSO USED AS THE UPC
                    0003     285 ;SERIAL INPUT.  WHEN USED THIS WAY THE SENSE IS INVERTED.  TO SIMPLIFY
                    0003     286 ;MATTERS THE NEXT TWO EQUATES ARE INCLUDED
                    0003     287
          000000A8  0003     288 CLRUPC          =<^XA8>                 ;(WO) CLEAR THE V-BUS SERIAL INPUT
          000000A9  0003     289 SETUPC          =<^XA9>                 ;(WO) SET THE V-BUS SERIAL INPUT
                    0003     290
          000000AA  0003     291 SETATN          =<^XAA>                 ;(WO) SET CONSOLE ATTENTION
          000000AB  0003     292 CLRATN          =<^XAB>                 ;(WO) CLEAR CONSOLE ATTENTION
                    0003     293
          000000AC  0003     294 SETPFI          =<^XAC>                 ;(WO) SET POWER FAIL INTERRUPT
          000000AD  0003     295 CLRPFI          =<^XAD>                 ;(WO) CLEAR POWER FAIL INTERRUPT
                    0003     296
          000000AE  0003     297 SETHLT          =<^XAE>                 ;(WO) SET THE CONSOLE HALT BIT
          000000AF  0003     298 CLRHLT          =<^XAF>                 ;(WO) CLEAR THE CONSOLE HALT BIT
                    0003     299
          000000CC  0003     300 WRITE           =<^XCC>                 ;(WO) THE CONSOLE WRITE REGISTER
                    0003     301
          000000EC  0003     302 YBUSRD          =<^XEC>                 ;(RO) Y-BUS READ
                    0003     303
                    0003     304
                    0003     305 ;*******************************************************************
                    0003     306 ;
                    0003     307 ;  THE FOLLOWING EQUATES ARE USED AS PROGRAM CONSTANTS
                    0003     308 ;  THIS IS DONE WHERE EVER POSSIBLE TO CONTROL THE USAGE OF THESE
                    0003     309 ;  CONSTANTS -- SO THEY ARE DEFINED ONLY IN ONE PLACE --
                    0003     310 ;
                    0003     311 ;*******************************************************************
                    0003     312
```

```
00000001  0003    313 ADDR              = <^X1>          ;BIT 24 COMMAND + STATUS WORD
00000049  0003    314 APT_PARAM         = <^X49>         ;LS LOCATION FOR APT PARAMETERS
00000010  0003    315 BAD_STATUS        = <^X10>         ;BIT 4 COMMAND + STATUS WORD
00000080  0003    316 BEG_TST           = <^X80>         ;BIT 15 COMMAND + STATUS WORD
00004082  0003    317 BYTSUM            = <^X4082>       ;ADDRESS OF CHECKSUM IN BOOT BLOCK
000000FE  0003    318 CC_ADDR           = <^XFE>         ;LS ADDR OF ALU CC REG
00000008  0003    319 CLEARPAR_ERR      = <^X8>          ;BIT 27 COMMAND + STATUS WORD
00000010  0003    320 CONATT            = <^X10>         ;BIT 20 COMMAND + STATUS WORD
00000020  0003    321 CONACK            = <^X20>         ;BIT 21 COMMAND + STATUS WORD
00000002  0003    322 CONHLT            = <^X2>          ;BIT 17 COMMAND + STATUS WORD
00000004  0003    323 CON_LOOP          = <^X4>          ;BIT 10 COMMAND + STATUS WORD
00000080  0003    324 CON_RAM           = <^X80>         ;BIT 7 ON = SECT FOR CONSOLE RAM
00007003  0003    325 CON_VER_ADD       = <^X7003>       ;ADDRESS IN 8085 BASED TEST WHERE
          0003    326                                    ; VERSION NUMBER IS FOUND (2 BYTES)
00007005  0003    327 CON_NAME_ADD      = <^X7005>       ;ADDRESS IN 8085 BASED TEST WHERE
          0003    328                                    ; FILE NAME IS FOUND (LAST 2 BYTES)
0000000D  0003    329 CR                = <^X0D>         ;HEX VALUE OF CR
000040FD  0003    330 CRD_FLAGS         = <^X40FD>       ;ADDRESS OF CRD FLAGS IN BOOT BLOCK
000040FE  0003    331 CTLDIS            = <^X40FE>       ;BOOT BLOCK DISABLE CNTL CHAR FLAG
0000411A  0003    332 DIR_VECTOR        = <^X411A>       ;ADDRESS OF DIR COMMAND IN BOOT BLOCK
0000002E  0003    333 DOT_A             = <^X2E>         ;ASCII FOR DOT
00000040  0003    334 EMEMREF           = <^X40>         ;BIT 22 COMMAND + STATUS WORD
00000040  0003    335 EOS               = <^X40>         ;BIT 14 COMMAND + STATUS WORD
00007000  0003    336 EXEC_CONTESTS     = <^X7000>       ;BEGINNING OF TESTS = RAM LOAD ADDRESS
00000048  0003    337 FLAG_LOC          = <^X48>         ;LS LOCATION OF FLAG INFO TO WRITE
00000010  0003    338 FPA_PRES          = <^X10>         ;BIT 12 COMMAND + STATUS WORD
00004129  0003    339 GCVECT            = <^X4129>       ;ADDR OF GET CHAR ROUTINE IN BOOT BLOCK
00004123  0003    340 GLVECT            = <^X4123>       ;ADDR OF GET LINE ROUTINE IN BOOT BLOCK
00004145  0003    341 GSVECT            = <^X4145>       ;ADDR OF GET SILO ROUTINE IN BOOT BLOCK
00000001  0003    342 HEX_1             = <^X1>          ;HEX VALUE OF 1
00000003  0003    343 HEX_3             = <^X3>          ;HEX VALUE OF 3
00000004  0003    344 HEX_4             = <^X4>          ;HEX VALUE OF 4
00000007  0003    345 HEX_7             = <^X7>          ;HEX VALUE OF 7
00000008  0003    346 HEX_8             = <^X8>          ;HEX VALUE OF 8
00000010  0003    347 HEX_10            = <^X10>         ;HEX VALUE OF 10
0000000D  0003    348 HEX_0D            = <^X0D>         ;HEX VALUE OF D
0000001F  0003    349 HEX_1F            = <^X1F>         ;HEX VALUE OF 1F
00000020  0003    350 HEX_20            = <^X20>         ;HEX VALUE OF 20
00000021  0003    351 HEX_21            = <^X21>         ;HEX VALUE OF 21
0000002D  0003    352 HEX_2D            = <^X2D>         ;HEX VALUE OF 2D
00000030  0003    353 HEX_30            = <^X30>         ;HEX VALUE OF 30
0000003A  0003    354 HEX_3A            = <^X3A>         ;HEX VALUE OF 3A
0000003F  0003    355 HEX_3F            = <^X3F>         ;HEX VALUE OF 3F
00000040  0003    356 HEX_40            = <^X40>         ;HEX VALUE OF 40
00000041  0003    357 HEX_41            = <^X41>         ;HEX VALUE OF 41
00000050  0003    358 HEX_50            = <^X50>         ;HEX VALUE OF 50
0000007F  0003    359 HEX_7F            = <^X7F>         ;HEX VALUE OF 7F
00000080  0003    360 HEX_80            = <^X80>         ;HEX VALUE OF 80
000000FD  0003    361 HEX_FD            = <^XFD>         ;HEX VALUE OF FD
000000FF  0003    362 HEX_FF            = <^XFF>         ;HEX VALUE OF FF
00000080  0003    363 IDC_PRES          = <^X80>         ;BIT 31 COMMAND + STATUS WORD
00000008  0003    364 INVTIM            = <^X8>          ;BIT 19  COMMAND + STATUS WORD
0000000A  0003    365 LF                = <^XA>          ;HEX VALUE OF LINE FEED
00000005  0003    366 LS_5              = <^X5>          ;LS LOCATION 5 (ADDRESS)
00000006  0003    367 LS_6              = <^X6>          ;LS LOCATION 6 (DATA)
00000007  0003    368 LS_7              = <^X7>          ;LS LOCATION 7 (XFER POINTER)
0000000F  0003    369 LS_F              = <^XF>          ;LS LOCATION F (T15)
```

```
00000047  0003    370 LOOP_CNT_ADD      = <^X47>         ;ADDRESS OF LOOP COUNT
00000002  0003    371 LOOPING           = <^X2>          ;BIT 25 COMMAND + STATUS WORD
00000001  0003    372 MM_OR_LS          = <^X1>          ;MSB = MM XFER
00000008  0003    373 MM_SIZE           = <^X8>          ;BIT 11 COMMAND + STATUS WORD
00000001  0003    374 MOD_PRES_FLG      = <^X1>          ;BIT 1 ON = FPA, R80 OR IDC PRESENT
00000080  0003    375 NA                = <^X80>         ;BIT 23 COMMAND + STATUS WORD
00000080  0003    376 NEG_CNT           = <^X80>         ;MSB ON FOR NEGATIVE X COM COUNT
000040FF  0003    377 NOCHK             = <^X40FF>       ;FLAG IN BOOT BLOCK TO IGNORE <CR>
000040BB  0003    378 OFLAG             = <^X40BB>       ;CONTROL O FLAG IN BOOT BLOCK
00000040  0003    379 OPTIONAL_TST      = <^X40>         ;BIT 6 OF SECTION FLAG
0000007C  0003    380 OS_ADD            = <^X7C>         ;LS ADDRESS OF OS REGISTER
0000001B  0003    381 POWER_SEQ         = <^X1B>         ;ADDRESS OF POWER UP SEQ IN ROM
00004080  0003    382 PRI_STACK         = <^X4080>       ;STACK AREA IN BOOT BLOCK (128 BYTES)
00000004  0003    383 PWRFAIL           = <^X4>          ;BIT 18 COMMAND + STATUS WORD
00000080  0003    384 R80_PRES          = <^X80>         ;BIT 7 COMMAND + STATUS WORD
00007000  0003    385 RAM_LOAD_ADD      = EXEC_CONTESTS  ;ADDRESS RAM OVERLAYS LOAD AT.
0000414D  0003    386 RET_VECTOR        = <^X414D>       ;RETURN VECTOR TO CONSOLE FROM CRD
0000000B  0003    387 ROM_X_ADDRS       = <^XB>          ;ROM ADDRESS OF X COMMAND
0000413D  0003    388 RSVECT            = <^X413D>       ;ADDR OF READ SILO ROUTINE IN BOOT BLOCK
00000006  0003    389 SEC_LEN           = 6              ;LENGTH OF A SECTION NAME
00004138  0003    390 SCVECT            = <^X4138>       ;ADDR OF SEND CHAR ROUTINE IN BOOT BLOCK
00000002  0003    391 SETPAR_ERR        = <^X02>         ;BIT 9 COMMAND + STATUS WORD
00000004  0003    392 SINGLE_ERR        = <^X4>          ;BIT 26 COMMAND + STATUS WORD
00000001  0003    393 SIGNAL            = <^X1>          ;BIT 16 COMMAND + STATUS WORD
0000412E  0003    394 SLVECT            = <^X412E>       ;ADDR OF SEND LINE ROUTINE IN BOOT BLOCK
00004133  0003    395 SLVEC1            = <^X4133>       ;ADDR OF SPECIAL SEND LINE ROUTINE
00000020  0003    396 SPACE_A           = <^X20>         ;HEX VALUE OF SPACE
00004086  0003    397 SPBUFF            = <^X4086>       ;ADDRESS IN BOOT BLOCK WHERE SP STORED
00000000  0003    398 STNDRD_CON        = 0              ;BRANCH ADDRESS TO LOAD STNDARD CONSOLE
00000040  0003    399 STATUS            = <^X40>         ;ADDRESS OF COMMAND + STATUS WORD
00004117  0003    400 TU58_DRIVER       = <^X4117>       ;ADDRESS OF TU58 DRIVER
00000040  0003    401 UBE_PRES          = <^X40>         ;BIT 6 COMMAND + STATUS WORD
00000040  0003    402 UBS_BUSY          = <^X40>         ;BIT 30 COMMAND + STATUS WORD
00000020  0003    403 UBS_DC_LO         = <^X20>         ;BIT 29 COMMAND + STATUS WORD
00000010  0003    404 UBS_INIT          = <^X10>         ;BIT 28 COMMAND + STATUS WORD
00000001  0003    405 WCSERR            = <^X1>          ;BIT  8 COMMAND + STATUS WORD
00000044  0003    406 WCS_ADDR_DAT      = <^X44>         ;ADDRESS OF ADDRESS DATA WORD
00000062  0003    407 WCS_CL_FIFO       = <^X62>         ;ADDRESS OF CLEAR IDC FIFO ADDR
          0003    408                                    ; SUBROUTINE
00000600  0003    409 WCS_DAT_32_ADD    = <^X600>        ;ADDRESS OF DATA 32 XFER ROUTINE
0000005F  0003    410 WCS_DE_ICSR       = <^X5F>         ;ADDRESS OF DEPOSIT IDC CSR SUBROUTINE
00000060  0003    411 WCS_DE_IDAR       = <^X60>         ;ADDRESS OF DEPOSIT IDC DAR SUBROUTINE
00000061  0003    412 WCS_DE_DBUF       = <^X61>         ;ADDRESS OF DEPOSIT IDC DBUF SUBROUTINE
00000050  0003    413 WCS_DE_MCT        = <^X50>         ;ADDRESS OF DEPOSIT MCT SUBROUTINE
00000054  0003    414 WCS_DE_MM         = <^X54>         ;ADDRESS OF DEPOSIT MM SUBROUTINE
00000052  0003    415 WCS_DE_TB         = <^X52>         ;ADDRESS OF DEPOSIT TB SUBROUTINE
00000058  0003    416 WCS_DE_UBS        = <^X58>         ;ADDRESS OF DEPOSIT UBS SUBROUTINE
00000041  0003    417 WCS_ERR_NUM       = <^X41>         ;ADDRESS OF ERROR NUMBER DATA WORD
0000005C  0003    418 WCS_EX_DBUF       = <^X5C>         ;ADDRESS OF EXAMINE IDC DATA BUF
0000005A  0003    419 WCS_EX_ICSR       = <^X5A>         ;ADDRESS OF EXAMINE IDC CSR
0000005B  0003    420 WCS_EX_IDAR       = <^X5B>         ;ADDRESS OF EXAMINE IDC DAR
00000051  0003    421 WCS_EX_MCT        = <^X51>         ;ADDRESS OF EXAMINE MCT SUBROUTINE
00000055  0003    422 WCS_EX_MM         = <^X55>         ;ADDRESS OF EXAMINE MM SUBROUTINE
0000005D  0003    423 WCS_EX_PATT       = <^X5D>         ;ADDRESS OF EXAMINE IDC ECC PATTERN
0000005E  0003    424 WCS_EX_POSIT      = <^X5E>         ;ADDRESS OF EXAMINE IDC ECC POSITION
00000053  0003    425 WCS_EX_TB         = <^X53>         ;ADDRESS OF EXAMINE TB SUBROUTINE
00000059  0003    426 WCS_EX_UBS        = <^X59>         ;ADDRESS OF EXAMINE UBS SUBROUTINE
```

```
00000042  0003   427 WCS_EXP_DAT      = <^X42>                 ;ADDRESS OF 5>             ;ADD DATA WORD
00000000  0003   428 WCS_LOAD_ADD     = <^X0>                  ;ADDRESS WCS OVERLAYS LOAD AT.
00000046  0003   429 WCS_MOD_DAT      = <^X46>                 ;ADDRESS OF MODULE NUMBER DATA WORD
00000045  0003   430 WCS_MSK_DAT      = <^X45>                 ;ADDRESS OF ERROR MASK DATA WORD
00000043  0003   431 WCS_REC_DAT      = <^X43>                 ;ADDRESS OF RECEIVED DATA WORD
00000057  0003   432 WCS_REST_WR      = <^X57>                 ;RESTORE 2901 WORKING REGS SUBR ADDR
00000056  0003   433 WCS_SAVE_WR      = <^X56>                 ;SAVE 2901 WORKING REGS SUBR ADDR
00000063  0003   434 WCS_SEL_FIFOA    = <^X63>                 ;ADDRESS OF SELECT IDC FIFO A
          0003   435                                           ; SUBROUTINE
00000064  0003   436 WCS_SEL_FIFOB    = <^X64>                 ;ADDRESS OF SELECT IDC FIFO B
          0003   437                                           ; SUBROUTINE
00000606  0003   438 WCS_VER_ADD      = <^X606>                ;ADDRESS OF WCS BASED VERSION NUMBER
00000607  0003   439 WCS_FILE_NAME    = <^X607>                ;ADDRESS OF WCS BASED FILE NAME
00000020  0003   440 WRONG_LAB        = <^X20>                 ;BIT 5 COMMAND + STATUS WORD
00000020  0003   441 XFER             = <^X20>                 ;BIT 13 COMMAND + STATUS WORD
          0003   442
          0003   443 ;*****************************************************************************
          0003   444 ;
          0003   445 ;   THE FOLLOWING SET OF EQUATES DEFINE THE BITS USED IN
          0003   446 ;   THE COMMAND AND STATUS WORD
          0003   447 ;
          0003   448 ;*****************************************************************************
          0003   449
          0003   450 ;FLAG EQUATES
00000001  0003   451 LOOP_S_DEF       = <^X1>                  ;MASK USED TO SET LOOP ON ERROR
00000040  0003   452 LOOP_COM_S_DEF   = <^X40>                 ;MASK USED TO SET LOOP COMAND BIT
00000080  0003   453 SPECIAL_S_DEF    = <^X80>                 ;MASK USED TO SET SPECIAL BIT (USED
          0003   454                                           ; TO LOOP ON SIZING TESTS)
00000002  0003   455 NER_S_DEF        = <^X2>                  ;MASK USED TO SET NO ERROR REPORTS
00000004  0003   456 BELL_S_DEF       = <^X4>                  ;MASK USED TO SET BELL ON ERROR
00000008  0003   457 HALT_S_DEF       = <^X8>                  ;MASK USED TO SET HALT ON ERROR
00000010  0003   458 SER_S_DEF        = <^X10>                 ;MASK USED TO SET SINGLE ERR. REP.
00000020  0003   459 APT_S_DEF        = <^X20>                 ;MASK USED TO SET APT PRESENT
          0003   460                                           ; INDICATOR (NOT SETABLE BY SET
          0003   461                                           ; COMMAND)
          0003   462
000000BE  0003   463 LOOP_C_DEF       = <^XBE>                 ;MASK USED TO CLEAR LOOP ON ERROR
          0003   464                                           ; AND LOOP COMMAND BITS
000000BF  0003   465 LOOP_COM_C_DEF   = <^XBF>                 ;MASK USED TO CLEAR LOOP COMAND BIT
0000007F  0003   466 SPECIAL_C_DEF    = <^X7F>                 ;MASK USED TO CLEAR SPECIAL BIT (USED
          0003   467                                           ; TO LOOP ON SIZING TESTS)
000000BD  0003   468 NER_C_DEF        = <^XBD>                 ;MASK USED TO CLEAR NO ERROR REPORT
          0003   469                                           ; AND LOOP COMMAND BITS
000000FB  0003   470 BELL_C_DEF       = <^XFB>                 ;MASK USED TO CLEAR BELL ON ERROR
000000F7  0003   471 HALT_C_DEF       = <^XF7>                 ;MASK USED TO CLEAR HALT ON ERROR
000000EF  0003   472 SER_C_DEF        = <^XEF>                 ;MASK USED TO CLEAR SINGLE ERR. REP.
000000DF  0003   473 APT_C_DEF        = <^XDF>                 ;MASK USED TO CLEAR APT PRESENT
          0003   474                                           ; INDICATOR (NOT CLEARABLE BY CLEAR
          0003   475                                           ; COMMAND)
          0003   476
          0003   477 ;*****************************************************************************
          0003   478 ;
          0003   479 ;   PARAMETER BLOCK FOR TU58 DRIVER
          0003   480 ;
          0003   481 ;*****************************************************************************
          0003   482
          0003   483                                           ;TU58 DRIVER PARAMETER BLOCK
```

```
00004106  0003   SEC_PARMB_UNIT  = <^X4106>                ;UNIT NUMBER
00004107  0003   SEC_PARMB_NAM   = <^X4107>                ;FILENAME
0000410D  0003   SEC_PARMB_EXT   = <^X410D>                ;DOT PLUS FILE EXTENTION
00004111  0003   SEC_PARMB_ADD   = <^X4111>                ;LOAD ADDRESS
00004115  0003   SEC_PARMB_DST   = <^X4115>                ;DESTINATION 6=RAM 7=WCS
00004116  0003   SEC_PARMB_ERR   = <^X4116>                ;ERROR RETURN BYTE
00004150  0003   SEC_PARMB_DEF   = <^X4150>                ;DEFAULT DRIVE (WHERE MICMON WAS LOADED
          0003                                             ; FROM)
          0003
          0003  ;**********************************************************************
          0003  ;
          0003  ;   EXTERNAL REFERENCES
          0003  ;   ALL EXTERNAL REFERENCES MUST BE LISTED HERE
          0003  ;
          0003  ;**********************************************************************
          0003
          0003                         .GLOBAL COMPARE,EOS_FLG,FLAGS,HEX_BUF
          0003                         .GLOBAL MOVER,PRINT,PRINT_HEX,SPACE
          0003                         .GLOBAL MWCS_A,MCPU_A,CR,LF,HEX_3,CC_ADDR,CRLF
          0003                         .GLOBAL SHIFT_PNT,F_WORD,SHIFTER,DOLOOP
          0003                         .GLOBAL NOP_CSR,READ_WCS,WCS_ADDRESS,WCS_VALUE
          0003                         .GLOBAL WRITE_WCS,X_SET_PAGE,PERFORM_CSR
          0003                         .GLOBAL X_CLR_PAGE,WCS_VAL_SHIFT
          0003                         .GLOBAL CSR_VALUE,LOAD_CSR,UPC_VALUE,LOAD_UPC
          0003                         .GLOBAL PARITY_JUMP,PARITY_ON,X_MOV_WRWR
          0003                         .GLOBAL SHIFT_L_2901,SHIFT_R_2901,DATA0
          0003                         .GLOBAL READ_DATA_32,WRITE_DATA_32,X_CLR_WR0
          0003                         .GLOBAL DATA1,DATA2,DATA3,DATA_SHIFT
          0003                         .GLOBAL READ_LS,WRITE_LS,INC_WORD,OS_ADD
          0003                         .GLOBAL NOP_INST,CSR_SHIFT,X_COM_WR0
          0003                         .GLOBAL MAKE_XD,XD_ADDRS,X_ROT_L,X_SHIFT_L
          0003                         .GLOBAL WCS_BAD_PARITY,POWER_BRANCH,WCS_SHIFT
          0003
          0003                         .GLOBAL PRINT_STRING,MOVER_4,PRINT_HEX_1,LD_UPC
          0003                         .GLOBAL CON_ADD_DAT,CON_ERR_NUM,CON_EXP_DAT
          0003                         .GLOBAL CON_EXP_ADD,CON_MOD_DAT,CON_MSK_DAT
          0003                         .GLOBAL CON_REC_DAT,CON_REC_ADD,ERROR_CON,MOVER_3
          0003                         .GLOBAL NA_EXP_REC,NA_OTHER,SKIP_TEST,MSK_ERROR
          0003                         .GLOBAL CON_ERROR,CON_BEGIN_TEST,GCVECT,WCS_READ
          0003                         .GLOBAL WCS_WRITE,CONTINUE,CNTLC_TYPED,SET_FOR_CONT
          0003                         .GLOBAL CLEAR_CPU_ATT,SHIFTER1,X_SHIFT_R,DECR_WORD
          0003                         .GLOBAL MICRO_STEP_CPU,WRITE_TAB_PNT
          0003                         .GLOBAL APT,APT_PASS_CNT
          0003
          0003  ;**********************************************************************
          0003  ;
          0003  ;   APT INFORMATION.... THE ADDRESS OF THESE VARIABLES MUST NOT CHANGE
          0003  ;   IN OFFSET FROM THE BEGINNING OF THIS PROGRAM.
          0003  ;
          0003  ;**********************************************************************
          0003
00000006  0003   OVERLAY_RAM::     .BLKB   3               ;STARTING ADDRESS FOR RAM TESTS
          0006                                             ; STARTED BY APT (NOT USED FOR CRD)
00000009  0006   OVERLAY_WCS::     .BLKB   3               ;STARTING ADDRESS FOR WCS TESTS
          0009                                             ; STARTED BY APT (NOT USED FOR CRD)
    7000  0009   APT_RAM_LD_ADD:   .WORD   EXEC_CONTESTS   ;POINTER TO RAM OVERLAY LOAD ADDRESS
00000010  000B                     .BLKB   5
```

```
                0010    541 APT_MAIL_BOX:
          0000  0010    542 APT_MESSAGE_CODE:.WORD  0                       ;FLAG 1=TEST START  2=ERROR
          0000  0012    543 APT_ERROR_NUMBER:.WORD  0                       ;DIAGNOSTIC ERROR NUMBER
          0000  0014    544 APT_SUBTEST:     .WORD  0                       ;SUBTEST NUMBER FILLER
          0000  0016    545 APT_TEST_NUMBER:.WORD   0                       ;FAILING TEST NUMBER
          0000  0018    546 APT_PASS_CNT:    .WORD  0                       ;# PASSES EXECUTED
      0000001C  001A    547                  .BLKB  2                       ;RESERVED FILLER
            00  001C    548 APT_MEM_SIZE:    .BYTE  0                       ;APT MEMORY SIZE
            00  001D    549 APT_HARD_FLG:    .BYTE  0                       ;APT HARDWARE INFORMATION
            00  001E    550 APT_SOFT_FLG:    .BYTE  0                       ;APT SOFTWARE INFORMATION
      00000022  001F    551                  .BLKB  3                       ;RESERVED FILLER
                0022    552
                0022    553 ;*****************************************************************************
                0022    554 ;
                0022    555 ;   RETURN VECTORS - THE FOLLOWING FOUR INSTRUCTIONS ARE USED AS THE RETURN
                0022    556 ;   POINT FOR SOME BOOT BLOCK ROUTINES.  THE NEXT BYTE IS A FLAG READ BY THE
                0022    557 ;   BOOT BLOCK TO DETERMINE IF MICMON IS LOADED.  THE NEXT TWO INSTRUCTIONS
                0022    558 ;   ARE ALSO USED AS VECTORS FROM THE BOOT BLOCK.  THEY MUST NOT CHANGE IN
                0022    559 ;   OFFSET FROM THE BEGINNING OF THIS PROGRAM.
                0022    560 ;
                0022    561 ;*****************************************************************************
                0022    562
                0022    563                         JMP     PARITY_ERR      ;RETURN FROM PARITY ERROR
            C3  0022                   .BYTE    ^0303
         193A'  0023                   .WORD    <PARITY_ERR-HEAD>
                0025    564                         JMP     POWER_REC       ;RETURN FROM POWER FAIL RECOVER
            C3  0025                   .BYTE    ^0303
         1C0C'  0026                   .WORD    <POWER_REC-HEAD>
                0028    565                         JMP     CNTLC_VEC       ;RETURN FROM CNTL C TYPED
            C3  0028                   .BYTE    ^0303
         1063'  0029                   .WORD    <CNTLC_VEC-HEAD>
                002B    566                         JMP     CNTLP_VEC       ;RETURN FROM CNTL P TYPED
            C3  002B                   .BYTE    ^0303
         1070'  002C                   .WORD    <CNTLP_VEC-HEAD>
            01  002E    567 MICFLAG:                .BYTE           1       ;FLAG SO BOOT BLOCK KNOWS MIC RESIDENT
                002F    568                         JMP     TIMER_VEC       ;RETURN FROM INTERVAL TIMER INTERRUPT
            C3  002F                   .BYTE    ^0303
         1C23'  0030                   .WORD    <TIMER_VEC-HEAD>
                0032    569                         JMP     AUTO_TEST       ;ENTER MICMON IN AUTO TEST MODE
            C3  0032                   .BYTE    ^0303
         1C24'  0033                   .WORD    <AUTO_TEST-HEAD>
      00000038  0035    570                         .BLKB   3               ;RESERVED FILLER FOR NEW RETURN VECTORS
                0038    571
                0038    572 ;*****************************************************************************
                0038    573 ;
                0038    574 ;           THE FOLLOWING DECLARATIONS ARE FOR GLOBAL VARIABLES.
                0038    575 ;           DO NOT DISPLACE FROM THEIR CURRENT LOCATIONS.
                0038    576 ;           ADD NEW VARIABLES AFTER ALL GLOBAL DECLARATIONS.
                0038    577 ;
                0038    578 ;*****************************************************************************
                0038    579
            00  0038    580 APT:                .BYTE           0               ;FLAG 1=APT PRESENT
            00  0039    581 CNTLC_TYPED:        .BYTE           0               ;FLAG 1=CONTROL C WAS TYPED
            00  003A    582 CONTINUE:           .BYTE           0               ;FLAG 1=CONTINUE MODE ENABLED
      0000003F  003B    583 CON_ADD_DAT:        .BLKB           4               ;OTHER DATA
            01  003F    584 CON_ERR_NUM:        .BYTE           1               ;CONSOLE BASED ERROR NUMBER
      00000044  0040    585 CON_EXP_DAT:        .BLKB           4               ;EXPECTED DATA
```

```
00000046  0044    586 CON_EXP_ADD:     .BLKB       2                  ;EXP DAT ADDR USED BY MSK_ERR
0000004B  0046    587 CON_MOD_DAT:     .BLKB       5                  ;ASCII MODULE NAME-FILLED IN
0000004F  004B    588 CON_MSK_DAT:     .BLKB       4                  ;MASK DATA
00000053  004F    589 CON_REC_DAT:     .BLKB       4                  ;RECEIVED DATA
00000055  0053    590 CON_REC_ADD:     .BLKB       2                  ;REC DAT ADDR USED BY MSK_ERR
      00  0055    591 DOLOOP:          .BYTE       0                  ;DO MACRO LOOP COUNTER
      00  0056    592 EOS_FLG:         .BYTE       0                  ;FLAG 1=END OF SECTION
      00  0057    593 ERROR_CON:       .BYTE       0                  ;FLAG 1=ERROR EXISTS
    FFFF  0058    594 F_WORD:          .WORD       <^XFFFF>
      00  005A    595 FLAGS:           .BYTE       0                  ;HALT,LOOP,NER,BELL,SER
0000005F  005B    596 HEX_BUF:         .BLKB       4                  ;HEX PRINT OUT BUFFER
      00  005F    597 NA_EXP_REC:      .BYTE       0                  ;FLAG 1=N/A FOR EXP AND REC DA
      00  0060    598 NA_OTHER:        .BYTE       0                  ;FLAG 1=N/A FOR OTHER DATA
          0061    599 PARITY_JUMP:     JMP         PARITY_ERR
      C3  0061                  .BYTE  ^0303
   193A'  0062                  .WORD  <PARITY_ERR-HEAD>
      01  0064    600 PARITY_ON:       .BYTE       1                  ;FLAG 1=CALCULATE PARITY
          0065    601 POWER_BRANCH:    JMP         POWER_REC
      C3  0065                  .BYTE  ^0303
   1C0C'  0066                  .WORD  <POWER_REC-HEAD>
    0000  0068    602 SHIFT_PNT:       .WORD       0                  ;SHIFT ROUTINE DATA POINTER
      00  006A    603 SKIP_TEST:       .BYTE       0                  ;FLAG 1=SKIP TEST # IS TO LOW
      02  006B    604 WCS_SHIFT:       .BYTE       2                  ;TWO BYTES OF SHIFT DATA FOLLOW
    0000  006C    605 WCS_ADDRESS:     .WORD       0                  ;WCS ADDRESS TO READ OR WRITE
      00  006E    606 WCS_BAD_PARITY:  .BYTE       0                  ;FLAG 1=WRITE BAD PARITY
    0000  006F    607 WRITE_TAB_PNT:   .WORD       0                  ;POINTER TO UPC ADDRES TABLE
      00  0071    608 XD_ADDRS:        .BYTE       0                  ;XD ADDRS FIELD OF CPU INST
          0072    609
          0072    610 ;GLOBAL CSR EXECUTABLE CODE
          0072    611
      DB  0072    612 NOP_INST:        .BYTE       <^XDB>             ;NOP INST FOR CPU CSR
      00  0073    613                  .BYTE       <^X00>
      15  0074    614                  .BYTE       <^X15>
      01  0075    615 X_SHIFT_L:       .BYTE       1
      23  0076    616                  .BYTE       <^X23>             ;CLR WR[1]
      D0  0077    617                  .BYTE       <^XD0>
      15  0078    618                  .BYTE       <^X15>
          0079    619
      01  0079    620 X_ROT_L:         .BYTE       1
      A3  007A    621                  .BYTE       <^XA3>             ;ROL WR[0]
      C0  007B    622                  .BYTE       <^XC0>             ;SHIFT LEFT 1 PLACE
      15  007C    623                  .BYTE       <^X15>
          007D    624
      01  007D    625 X_CLR_PAGE:      .BYTE       1
      90  007E    626                  .BYTE       <^X90>             ;MISC [CLR.HIGH.PAGE]
      A0  007F    627                  .BYTE       <^XA0>
      15  0080    628                  .BYTE       <^X15>
          0081    629
      01  0081    630 X_SET_PAGE:      .BYTE       1
      10  0082    631                  .BYTE       <^X10>             ;MISC [SET.HIGH.PAGE]
      B0  0083    632                  .BYTE       <^XB0>
      15  0084    633                  .BYTE       <^X15>
          0085    634
          0085    635
          0085    636 ;  This subroutine shifts the contents of WR[0] right 8 bits and leaves the
          0085    637 ;  result on the Y-bus.  The monitor can clock the console read register to
          0085    638 ;  read the result.  To be executed 3 times by the monitor for a 32 bit WR
```

```
        0085     639 ;  read.  ROR will have to have been checked by the console.
        0085     640
   08   0085     641 X_SHIFT_R:     .BYTE          8
   23   0086     642                .BYTE          <^X23>         ;ROR
   40   0087     643                .BYTE          <^X40>
   15   0088     644                .BYTE          <^X15>
        0089     645
   23   0089     646                .BYTE          <^X23>         ;ROR
   40   008A     647                .BYTE          <^X40>
   15   008B     648                .BYTE          <^X15>
        008C     649
   23   008C     650                .BYTE          <^X23>         ;ROR
   40   008D     651                .BYTE          <^X40>
   15   008E     652                .BYTE          <^X15>
        008F     653
   23   008F     654                .BYTE          <^X23>         ;ROR
   40   0090     655                .BYTE          <^X40>
   15   0091     656                .BYTE          <^X15>
        0092     657
   23   0092     658                .BYTE          <^X23>         ;ROR
   40   0093     659                .BYTE          <^X40>
   15   0094     660                .BYTE          <^X15>
        0095     661
   23   0095     662                .BYTE          <^X23>         ;ROR
   40   0096     663                .BYTE          <^X40>
   15   0097     664                .BYTE          <^X15>
        0098     665
   23   0098     666                .BYTE          <^X23>         ;ROR
   40   0099     667                .BYTE          <^X40>
   15   009A     668                .BYTE          <^X15>
        009B     669
   23   009B     670                .BYTE          <^X23>         ;ROR
   40   009C     671                .BYTE          <^X40>
   15   009D     672                .BYTE          <^X15>
        009E     673
   A0   009E     674 X_MOV_WRWR:    .BYTE          <^XA0>         ;MOV WR[0] TO WR[0]
   00   009F     675                .BYTE          <^X00>         ;MOVE DATA TO Y-BUS
   15   00A0     676                .BYTE          <^X15>         ;TO BE READ
        00A1     677
        00A1     678
        00A1     679
   02   00A1     680 X_CLR_WR0:     .BYTE          2
   2F   00A2     681                .BYTE          <^X2F>         ;CLR WR[0]
   80   00A3     682                .BYTE          <^X80>
   15   00A4     683                .BYTE          <^X15>
        00A5     684
   A0   00A5     685 X_COM_WR0:     .BYTE          <^XA0>         ;COM WR[0]
   C0   00A6     686                .BYTE          <^XC0>
   15   00A7     687                .BYTE          <^X15>
        00A8     688
        00A8     689 ;*************************************************************************
        00A8     690 ;
        00A8     691 ;  DATA AREA FOR READS AND WRITES TO CPU (32 BITS)
        00A8     692 ;
        00A8     693 ;*************************************************************************
        00A8     694
   04   00A8     695 DATA_SHIFT:    .BYTE          4              ;FOUR BYTE OF SHIFT DATA
```

```
         00  00A9   696 DATA0:          .BYTE           0               ;MSB OF 32 BIT DATA AREA
         00  00AA   697 DATA1:          .BYTE           0
         00  00AB   698 DATA2:          .BYTE           0
         00  00AC   699 DATA3:          .BYTE           0               ;LSB OF 32 BIT DATA AREA
   000000AF  00AD   700                 .BLKB           2               ;EXTENDED DATA FOR 3 BYTE MOVES
             00AF   701
         00  00AF   702 COMMAND0:       .BYTE           0               ;MSB OF 32 BIT COMMAND+STATUS
         00  00B0   703 COMMAND1:       .BYTE           0               ;WORD
         00  00B1   704 COMMAND2:       .BYTE           0
         00  00B2   705 COMMAND3:       .BYTE           0               ;LSB OF 32 BIT COMMAND+STATUS
             00B3   706
         03  00B3   707 WCS_VAL_SHIFT:  .BYTE           3               ;SHIFT 3 BYTES OF DATA
   000000B7  00B4   708 WCS_VALUE:      .BLKB           3               ;WCS WORD TO BE WRITTEN
             00B7   709
             00B7   710
             00B7   711 ;*********************************************************************
             00B7   712 ;
             00B7   713 ;  CSR DATA BUFFER
             00B7   714 ;
             00B7   715 ;*********************************************************************
             00B7   716
         03  00B7   717 CSR_SHIFT:      .BYTE           3               ;3 BYTES OF DATA
   000000BB  00B8   718 CSR_VALUE:      .BLKB           3
   000000BE  00BB   719 SAVED_CSR:      .BLKB           3
   000000C1  00BE   720 CONT_SAVE_CSR:  .BLKB           3
             00C1   721
             00C1   722 ;*********************************************************************
             00C1   723 ;
             00C1   724 ; UPC DATA BUFFER
             00C1   725 ;
             00C1   726 ;*********************************************************************
             00C1   727
         02  00C1   728 UPC_SHIFT:      .BYTE           2               ;2 BYTES OF DATA
   000000C4  00C2   729 UPC_VALUE:      .BLKB           2
   000000C6  00C4   730 SAVED_UPC:      .BLKB           2
   000000C8  00C6   731 UPC_SUB:        .BLKB           2
   000000CA  00C8   732 CONT_SAVE_UPC:  .BLKB           2
   000000CC  00CA   733 UPC_COMPARE:    .BLKB           2
   000000CF  00CC   734 ATT_UPC_SAVE:   .BLKB           3
             00CF   735
             00CF   736 ;JUMPS TO GLOBAL SUBROUTINES
             00CF   737 COMPARE:                JMP             COMPARE_R
         C3  00CF                       .BYTE   ^0303
      0F55'  00D0                       .WORD   <COMPARE_R-HEAD>
             00D2   738 MOVER:                  JMP             MOVER_R
         C3  00D2                       .BYTE   ^0303
      0F75'  00D3                       .WORD   <MOVER_R-HEAD>
             00D5   739 PRINT:                  JMP             PRINT_R
         C3  00D5                       .BYTE   ^0303
      1027'  00D6                       .WORD   <PRINT_R-HEAD>
             00D8   740 PRINT_HEX:              RET
         C9  00D8                       .BYTE   ^0311
             00D9   741                         RET
         C9  00D9                       .BYTE   ^0311
             00DA   742                         RET
         C9  00DA                       .BYTE   ^0311
             00DB   743 SPACE:                  JMP             SPACE_R
```

```
     C3  00DB                        .BYTE     ^0303
  1021'  00DC                        .WORD     <SPACE_R-HEAD>
         00DE   744 CRLF:                      JMP          CRLF_R
     C3  00DE                        .BYTE     ^0303
  101A'  00DF                        .WORD     <CRLF_R-HEAD>
         00E1   745 SHIFTER:                   JMP          SHIFTER_R
     C3  00E1                        .BYTE     ^0303
  0EB8'  00E2                        .WORD     <SHIFTER_R-HEAD>
         00E4   746 NOP_CSR:                   JMP          NOP_CSR_R
     C3  00E4                        .BYTE     ^0303
  0ECA'  00E5                        .WORD     <NOP_CSR_R-HEAD>
         00E7   747 READ_WCS:                  JMP          READ_WCS_R
     C3  00E7                        .BYTE     ^0303
  0E6D'  00E8                        .WORD     <READ_WCS_R-HEAD>
         00EA   748 WRITE_WCS:                 JMP          WRITE_WCS_R
     C3  00EA                        .BYTE     ^0303
  0E8A'  00EB                        .WORD     <WRITE_WCS_R-HEAD>
         00ED   749 PERFORM_CSR:               JMP          PERFORM_CSR_R
     C3  00ED                        .BYTE     ^0303
  12F2'  00EE                        .WORD     <PERFORM_CSR_R-HEAD>
         00F0   750 LOAD_CSR:                  JMP          LOAD_CSR_R
     C3  00F0                        .BYTE     ^0303
  0EE7'  00F1                        .WORD     <LOAD_CSR_R-HEAD>
         00F3   751 LOAD_UPC:                  JMP          LOAD_UPC_R
     C3  00F3                        .BYTE     ^0303
  0F19'  00F4                        .WORD     <LOAD_UPC_R-HEAD>
         00F6   752 SHIFT_L_2901:              JMP          SHIFT_L_2901_R
     C3  00F6                        .BYTE     ^0303
  1249'  00F7                        .WORD     <SHIFT_L_2901_R-HEAD>
         00F9   753 SHIFT_R_2901:              JMP          SHIFT_R_2901_R
     C3  00F9                        .BYTE     ^0303
  1250'  00FA                        .WORD     <SHIFT_R_2901_R-HEAD>
         00FC   754 READ_DATA_32:              JMP          READ_DATA_32_R
     C3  00FC                        .BYTE     ^0303
  11B4'  00FD                        .WORD     <READ_DATA_32_R-HEAD>
         00FF   755 WRITE_DATA_32:             JMP          WRITE_DATA_32_R
     C3  00FF                        .BYTE     ^0303
  11D2'  0100                        .WORD     <WRITE_DATA_32_R-HEAD>
         0102   756 READ_LS:                   JMP          READ_LS_R
     C3  0102                        .BYTE     ^0303
  1167'  0103                        .WORD     <READ_LS_R-HEAD>
         0105   757 WRITE_LS:                  JMP          WRITE_LS_R
     C3  0105                        .BYTE     ^0303
  1146'  0106                        .WORD     <WRITE_LS_R-HEAD>
         0108   758 INC_WORD:                  JMP          INC_WORD_R
     C3  0108                        .BYTE     ^0303
  12B1'  0109                        .WORD     <INC_WORD_R-HEAD>
         010B   759 MAKE_XD:                   JMP          MAKE_XD_R
     C3  010B                        .BYTE     ^0303
  1183'  010C                        .WORD     <MAKE_XD_R-HEAD>
         010E   760 PRINT_STRING:              RET
     C9  010E                        .BYTE     ^0311
         010F   761                            RET
     C9  010F                        .BYTE     ^0311
         0110   762                            RET
     C9  0110                        .BYTE     ^0311
         0111   763 MOVER_4:                   JMP          MOVER_4_R
```

```
               C3  0111                    .BYTE    ^0303
            0F73'  0112                    .WORD    <MOVER_4_R-HEAD>
                   0114   764 PRINT_HEX_1:  JMP               PRINT_HEX_1_R
               C3  0114                    .BYTE    ^0303
            0F94'  0115                    .WORD    <PRINT_HEX_1_R-HEAD>
                   0117   765 LD_UPC:       JMP               LD_UPC_R
               C3  0117                    .BYTE    ^0303
            1FCC'  0118                    .WORD    <LD_UPC_R-HEAD>
                   011A   766 MOVER_3:      JMP               MOVER_3_R
               C3  011A                    .BYTE    ^0303
            0F5F'  011B                    .WORD    <MOVER_3_R-HEAD>
                   011D   767 MSK_ERROR:    JMP               MSK_ERROR_R
               C3  011D                    .BYTE    ^0303
            1F31'  011E                    .WORD    <MSK_ERROR_R-HEAD>
                   0120   768 CON_ERROR:    JMP               CON_ERROR_R
               C3  0120                    .BYTE    ^0303
            1F14'  0121                    .WORD    <CON_ERROR_R-HEAD>
                   0123   769 CON_BEGIN_TEST: JMP             CON_BEGIN_TEST_R
               C3  0123                    .BYTE    ^0303
            1EC9'  0124                    .WORD    <CON_BEGIN_TEST_R-HEAD>
                   0126   770 WCS_READ:     JMP               WCS_READ_R
               C3  0126                    .BYTE    ^0303
            1F80'  0127                    .WORD    <WCS_READ_R-HEAD>
                   0129   771 WCS_WRITE:    JMP               WCS_WRITE_R
               C3  0129                    .BYTE    ^0303
            1FB6'  012A                    .WORD    <WCS_WRITE_R-HEAD>
                   012C   772 SET_FOR_CONT: JMP               SET_FOR_CONT_R
               C3  012C                    .BYTE    ^0303
            107B'  012D                    .WORD    <SET_FOR_CONT_R-HEAD>
                   012F   773 CLEAR_CPU_ATT: JMP              CLEAR_CPU_ATT_R
               C3  012F                    .BYTE    ^0303
            1A61'  0130                    .WORD    <CLEAR_CPU_ATT_R-HEAD>
                   0132   774 SHIFTER1:     JMP               SHIFTER1_R
               C3  0132                    .BYTE    ^0303
            0EC1'  0133                    .WORD    <SHIFTER1_R-HEAD>
                   0135   775 DECR_WORD:    JMP               DECR_WORD_R
               C3  0135                    .BYTE    ^0303
            12BC'  0136                    .WORD    <DECR_WORD_R-HEAD>
                   0138   776 MICRO_STEP_CPU: JMP             MICRO_STEP_CPU_R
               C3  0138                    .BYTE    ^0303
            12A0'  0139                    .WORD    <MICRO_STEP_CPU_R-HEAD>
                   013B   777
                   013B   778 ;***********************************************************************
                   013B   779 ;
                   013B   780 ;   MODULE LITERALS
                   013B   781 ;
                   013B   782 ;***********************************************************************
                   013B   783
                   013B   784 PRT_MOD_A:
34 39 33 38 4D     013B   785 MWCS_A:            .ASCII      "M8394"       ;WCS
30 39 33 38 4D     0140   786 MCPU_A:            .ASCII      "M8390"       ;CPU
31 39 33 38 4D     0145   787 MMCT_A:            .ASCII      "M8391"       ;MCT
39 38 33 38 4D     014A   788 MFPA_A:            .ASCII      "M8389"       ;FPA
38 32 37 38 4D     014F   789 MMEM_A:            .ASCII      "M8728"       ;MEMORY ARRAY CARD
38 38 33 38 4D     0154   790 MIDC_A:            .ASCII      "M8388"       ;IDC
20 31 41 51 44     0159   791 MRL02_A:           .ASCII      "DQA1 "       ;RL02
20 30 41 51 44     015E   792 MR80_A:            .ASCII      "DQA0 "       ;R80
```

```
                                    0163    793
                                    0163    794 ;**********************************************************************************************
                                    0163    795 ;
                                    0163    796 ;               ALL PRECEDING DECLARATIONS ARE FOR GLOBAL VARIABLES.
                                    0163    797 ;               DO NOT DISPLACE ANY OF THESE FROM THEIR CURRENT LOCATIONS.
                                    0163    798 ;               ALL NEW VARIABLES MUST BE ADDED BELOW THIS POINT.
                                    0163    799 ;
                                    0163    800 ;**********************************************************************************************
                                    0163    801
                                    0163    802
                                    0163    803 ;VARIABLES
                                00  0163    804 A_ADDRS:            .BYTE       0                   ;A ADDRS FIELD OF CPU INST
                                15  0164    805 ABORT_A:            .BYTE       21                  ;CHAR COUNT
41 20 54 53 45 54 20 4F 54 55 41 0D  0165    806                     .ASCII      <CR>"AUTO TEST ABORTED - "
         20 2D 20 44 45 54 52 4F 42  0171
                                00  017A    807 ACK_SAVE:           .BYTE       0                   ;SAVE CPU ACK FOR SUBROUTINES
                                31  017B    808 ASCII_1:            .ASCII      "1"
                                32  017C    809 ASCII_2:            .ASCII      "2"
                                33  017D    810 ASCII_3:            .ASCII      "3"
                                1A  017E    811 BAD_A:              .BYTE       26
20 4C 4C 41 43 20 2D 20 44 41 42 20  017F    812                     .ASCII      " BAD - CALL FIELD SERVICE"<CR>
43 49 56 52 45 53 20 44 4C 45 49 46  018B
                             0D 45  0197
                                A6  0199    813 BAD_TAPE_A:         .BYTE       166
4F 52 50 20 20 20 20 20 20 2A 2A 0D  019A    814                     .ASCII      <CR>"**      PROPER SETUP REQUIRED - CANNOT "
45 52 20 50 55 54 45 53 20 52 45 50  01A6
4E 41 43 20 2D 20 44 45 52 49 55 51  01B2
                       20 54 4F 4E  01BE
20 20 20 20 45 55 4E 49 54 4E 4F 43  01C2    815                     .ASCII      "CONTINUE      **"
                          2A 2A 20  01CE
44 20 4B 43 45 48 43 20 20 2A 2A 0D  01D1    816                     .ASCII      <CR>"**  CHECK DIAGNOSTIC TAPE INSERTED IN "
41 54 20 43 49 54 53 4F 4E 47 41 49  01DD
20 44 45 54 52 45 53 4E 49 20 45 50  01E9
                          20 4E 49  01F5
30 20 45 56 49 52 44 20 38 35 55 54  01F8    817                     .ASCII      "TU58 DRIVE 0  **"
                       2A 2A 20 20  0204
50 55 54 45 53 20 46 49 20 2A 2A 0D  0208    818                     .ASCII      <CR>"** IF SETUP CORRECT, POSSIBLE TAPE OR "
4F 50 20 2C 54 43 45 52 52 4F 43 20  0214
20 45 50 41 54 20 45 4C 42 49 53 53  0220
                          20 52 4F  022C
45 4C 42 4F 52 50 20 45 56 49 52 44  022F    819                     .ASCII      "DRIVE PROBLEM **"<CR>
                    0D 2A 2A 20 4D  023B
                                00  0240    820 B_ADDRS:            .BYTE       0                   ;B ADDRS FIELD OF CPU INST
                          00000247  0241    821 BOARD_NAME:         .BLKB       6                   ;BOARD NAME AREA
                          0000024D  0247    822 BOARD_BUF:          .BLKB       6                   ;BOARD NAME AREA
                                00  024D    823 BOARD_NUM:          .BYTE       0                   ;NUMBER OF BOARD INPUT
                              0000  024E    824 BOARD_PNT:          .WORD       0                   ;POINTER TO BOARD TABLE
                                00  0250    825 C_EXECUTE:          .BYTE       0                   ;TEMP FLAG HOLDING FOR CONTINUE
                                00  0251    826 C_RUNNING:          .BYTE       0                   ;TEMP FLAG HOLDING FOR CONTINUE
                              0000  0252    827 CALC_ADD:           .WORD       0                   ;ADDRESS TO CALC PARITY ON
                                00  0254    828 CNT_PAR:            .BYTE       0                   ;COUNT OF PAR ERRORS
                                00  0255    829 CONSOLE_TEST:       .BYTE       0                   ;FLAG 1=CONSOLE 0=WCS TEST
                                00  0256    830 CONT_DONE:          .BYTE       0                   ;FLAG 1=CONTINUE IS DONE DO RET
                                03  0257    831 CPU_A:              .BYTE       3                   ;BYTE COUNT
                          55 50 43  0258    832                     .ASCII      "CPU"
                                01  025B    833 CRLF_A:             .BYTE       1                   ;BYTE COUNT
                                0D  025C    834                     .ASCII      <CR>                ;CRLF FOR CALL CRLF ROUTINE
```

```
                           00  025D   835 CSR_CNT:          .BYTE     0                 ;COUNT OF CSR INST TO PERFORM
                           00  025E   836 DATA_XFER_FLG:    .BYTE     0                 ;FLAG 1=XFER WAS DONE
                     00000261  025F   837 ENK_END:          .BLKB     2                 ;STORAGE FOR LAST 2 CHARS OF
                               0261   838                                               ; SECTION NAME READ FROM FILE
                           00  0261   839                   .BYTE     0                 ;LAST CHAR IS NULL
                           66  0262   840 END_A:            .BYTE     102
20 46 4F 20 44 4E 45 20 2A 2A 2A 2A  0263   841                   .ASCII    "**** END OF VAX-11/730,725 AUTO TEST ****"<CR>
37 2C 30 33 37 2F 31 31 2D 58 41 56  026F
54 53 45 54 20 4F 54 55 41 20 35 32  027B
               0D 2A 2A 2A 2A 20  0287
54 20 47 4E 49 4E 52 55 54 45 52 0D  028D   842                   .ASCII    <CR>"RETURNING TO VAX-11/730,725 CONSOLE, WAIT FOR"
30 33 37 2F 31 31 2D 58 41 56 20 4F  0299
45 4C 4F 53 4E 4F 43 20 35 32 37 2C  02A5
      52 4F 46 20 54 49 41 57 20 2C  02B1
50 4D 4F 52 50 20 27 3E 3E 3E 27 20  02BB   843                   .ASCII    " '>>>' PROMPT"<CR>
                        0D 54  02C7
               43 43 4B 4E 45  02C9   844 ENKCC_A:          .ASCII    "ENKCC"
               45 43 4B 4E 45  02CE   845 ENKCE_A:          .ASCII    "ENKCE"
               48 43 4B 4E 45  02D3   846 ENKCH_A:          .ASCII    "ENKCH"
               46 43 4B 4E 45  02D8   847 ENKCF_A:          .ASCII    "ENKCF"
               47 43 4B 4E 45  02DD   848 ENKCG_A:          .ASCII    "ENKCG"
                           00  02E2   849 ERROR:            .BYTE     0                 ;FLAG
                           06  02E3   850 ERROR_A:          .BYTE     6                 ;CHAR COUNT
            52 4F 52 52 45 20  02E4   851                   .ASCII    " ERROR"
                           00  02EA   852 EXECUTE:          .BYTE     0                 ;FLAG 1=EXECUTE MODE
                  45 58 45 2E  02EB   853 EXT_A:            .ASCII    ".EXE"            ;ALL OVERLAYS ARE .EXE !!!!!!
                           0C  02EF   854 FAIL_A:           .BYTE     12                ;CHAR COUNT
0D 2A 44 45 4C 49 41 46 2A 20 20 20  02F0   855                   .ASCII    "   *FAILED*"<CR>
                           00  02FC   856 FAST_WRITE:       .BYTE     0                 ;FLAG 1=USE FAST WRITE ROUTINE
                           00  02FD   857 FILE_LOADED:      .BYTE     0                 ;SECTION LOADED FROM TAPE
                           03  02FE   858 FPA_A:            .BYTE     3                 ;CHAR COUNT
                     41 50 46  02FF   859                   .ASCII    "FPA"
                           3A  0302   860 HEADER_A:         .BYTE     58                ;CHAR COUNT
                           0D  0303   861                   .ASCII    <CR>
52 45 20 54 53 54 20 20 54 43 45 53  0304   862                   .ASCII    "SECT  TST ERR   EXP      REC       OTHER     "
20 20 20 20 20 50 58 45 20 20 20 52  0310
54 4F 20 20 20 20 20 20 43 45 52 20  031C
               20 20 20 20 52 45 48  0328
4C 55 44 4F 4D 20 20 20 20 4B 53 4D  032F   863                   .ASCII    "MSK    MODULE"<CR>
                        0D 45  033B
                           00  033D   864 HAVE_CNT:         .BYTE     0                 ;FLAG 1=WCS LOOP COUNT READ
                           05  033E   865 IDC_A:            .BYTE     5                 ;CHAR COUNT
               30 33 37 42 52  033F   866                   .ASCII    "RB730"
                           00  0344   867 INSTR_LEN:        .BYTE     0                 ;STORAGE FOR INSTRUCTION LENGTH
                        067A'  0345   868 INSTR_PNT:        .WORD     INSTR_TABLE       ;POINTER INTO INSTRUCTION TABLE
                           00  0347   869 LOOP_COUNTER:     .BYTE     0                 ;LOOP COUNTER
                           00  0348   870 LS_SETPARERR:     .BYTE     0                 ;PARITY ERROR SET BY CPU ATTN
                           00  0349   871 LS_PARERR_ACT:    .BYTE     0                 ;PAR ERR ACTIVE (BEING PROCESSED)
                           00  034A   872 MAX_SBE:          .BYTE     0                 ;MAXIMUM NUMBER OF SINGLE BIT
                           00  034B   873                   .BYTE     0                 ; ERRORS ALLOWED
                           3F  034C   874                   .BYTE     63
                           06  034D   875 MEMORY_A:         .BYTE     6
            59 52 4F 4D 45 4D  034E   876                   .ASCII    "MEMORY"
                           00  0354   877 MEM_REQ:          .BYTE     0                 ;FLAG 1=MEM REQ TO BE ENABLED
                           34  0355   878 MENU_A:           .BYTE     52
45 52 20 4F 54 20 31 20 45 50 59 54  0356   879                   .ASCII    "TYPE 1 TO RETURN TO CONSOLE,"
53 4E 4F 43 20 4F 54 20 4E 52 55 54  0362
```

```
                 2C 45 4C 4F  036E
52 41 54 53 45 52 20 4F 54 20 32 20  0372   880                      .ASCII    " 2 TO RESTART AUTO TEST "
20 54 53 45 54 20 4F 54 55 41 20 54  037E
                          00  038A   881 MICRO_STEP:          .BYTE     0                    ;FLAG NON 0=MICRO STEP MODE
                          00  038B   882 MINUS:               .BYTE     0                    ;FLAG 1=NEG NUMBER TYPED
                          08  038C   883 MINUTES_A:           .BYTE     8                    ;CHAR COUNT
        53 45 54 55 4E 49 4D 20  038D   884                      .ASCII    " MINUTES"
                          00  0395   885 MOD_ERR:             .BYTE     0                    ;FLAG 1=MODULE CALLED OUT
                          0F  0396   886 MOD_NOT_PRES_A:      .BYTE     15                   ;CHAR COUNT
42 41 4C 49 41 56 41 20 54 4F 4E 20  0397   887                      .ASCII    " NOT AVAILABLE"<CR>
                    0D 45 4C  03A3
                          08  03A6   888 MOD_PRES_A:          .BYTE     8                    ;CHAR COUNT
        54 4E 45 53 45 52 50 20  03A7   889                      .ASCII    " PRESENT"
                          00  03AF   890 MORE_DATA:           .BYTE     0                    ;FLAG 1=MORE DATA TO XFER
                          09  03B0   891 NA_A:                .BYTE     9                    ;CHAR COUNT
     20 20 20 20 41 2F 4E 20 20  03B1   892                      .ASCII    "  N/A    "
                       076F'  03BA   893 NAME_PNT:            .WORD     NAME_TABLE           ;POINTER INTO TEST NAME TABLE
                          00  03BC   894 NEWSUM:              .BYTE     0                    ;NEW CHECKSUM VALUE
                          00  03BD   895 NOADD_FLG:           .BYTE     0                    ;FLAG 1=NO ADDRESS ON EXAM+DEP
                          00  03BE   896 NOINIT:              .BYTE     0                    ;FLAG 1=NO INIT OF WCS (TESTO)
                          00  03BF   897 NO_RETURN:           .BYTE     0                    ;FLAG 1=NO RETURN AFTER MICMON
                              03C0   898                                                     ; ERROR
                          00  03C0   899 NO_SAVE_UPC_CSR:.BYTE          0                    ;FLAG 1= DON'T SAVE UPC OR CSR
                          00  03C1   900 NO_SPACE:            .BYTE     0                    ;FLAG 1=NO SPACE AFTER PR HEX
                          00  03C2   901 NOT_FOUND:           .BYTE     0                    ;FLAG 1=INPUT PARSED NOT FOUND
                    000003CD  03C3   902 OLD_TEMP_BUF:        .BLKB     10                   ;BACKUP TEMP BUFF FOR ERRORS
                        0000  03CD   903 OLD_TTBUF:           .WORD     0                    ;BACKUP POINTER TO TTBUF
                          00  03CF   904 OLDSUM:              .BYTE     0                    ;OLD CHECKSUM VALUE
                          04  03D0   905 OR_A:                .BYTE     4                    ;CHAR COUNT
                 20 52 4F 20  03D1   906                      .ASCII    " OR "
                          00  03D5   907 PACK_ERROR:          .BYTE     0                    ;FLAG 1=WRONG RL01 PACK
                          00  03D6   908 PAR_ON:              .BYTE     0                    ;FLAG 1=PARITY TO BE ENABLED
                        0000  03D7   909 PAR_VECT:            .WORD     0                    ;PARSER ADDRESS DEST ADDRESS
                          00  03D9   910 PARDONE:             .BYTE     0                    ;FLAG 1=END OF INPUT LINE
                        0000  03DA   911 PARSE_PNT:           .WORD     0                    ;POINTER TO PARSE BUFFER
                        0000  03DC   912 PARSE_TABLE:         .WORD     0                    ;POINTER TO PARSE TABLE
                          0B  03DE   913 PASS_A:              .BYTE     11
   0D 44 45 53 53 41 50 20 20 20 20  03DF   914                      .ASCII    "         PASSED"<CR>
                        0000  03EA   915 PASS_CNT:            .WORD     0                    ;PASS COUNTER
                          00  03EC   916 PRINT_CNT:           .BYTE     0                    ;NUMBER OF CHARS TO PRINT
                          00  03ED   917 PRINT_PASS:          .BYTE     0                    ;FLAG 1=PRINT PASS MESSAGE
                        0000  03EE   918 PRINT_PNT:           .WORD     0                    ;POINTER TO CHARS TO BE PRINTED
                          00  03F0   919 PRINT_START:         .BYTE     0                    ;FLAG 1=PRINT START MESSAGE
                          00  03F1   920 RESTART:             .BYTE     0                    ;FLAG 1=RESTART PARSER
0D 4F 43 20 31 30 20 45 54 20 49 44  03F2   921 RETRY_IDC2:          .ASCII    "DI TE 01 CO"<CR>
                          04  03FE   922 RL02_A:              .BYTE     4                    ;CHAR COUNT
                 31 41 51 44  03FF   923                      .ASCII    "DQA1"
                          00  0403   924 RUNNING:             .BYTE     0                    ;FLAG 1=CPU RUNNING MODE
                          00  0404   925 SECTION_B_NUM:       .BYTE     0                    ;BOARD NUMBER FROM SEC. TABLE
                          00  0405   926 SETACK_FLG:          .BYTE     0                    ;FLAG 1=SET CONSOLE ACKNOWLEDGE
                          00  0406   927 SKIP_CNT:            .BYTE     0                    ;NUMBER OF CHARS SPANED
                        0000  0407   928 STARTING_UPC:        .WORD     0                    ;STARTING UPC ADDRESS
                        0000  0409   929 STEP_CNT:            .WORD     0                    ;MICRO STEP COUNTER
                          00  040B   930 TABLE_MODE:          .BYTE     0                    ;TABLE MODE INDICATOR
                        0000  040C   931 TABLE_PNT:           .WORD     0                    ;SECTION TABLE POINTER
                    00000418  040E   932 TEMP_BUF:            .BLKB     10                   ;TEMP CHAR BUFFER
                          00  0418   933 TEMP_BYTE:           .BYTE     0                    ;TEMP STORAGE BYTE
```

```
                                    0000  0419   934 TEMP_WORD:        .WORD      0                  ;TEMP STORAGE WORD
                                    0000  041B   935 TEMP_WORD1:       .WORD      0                  ;TEMP STORAGE WORD
                                    0000  041D   936 TEMP_WORD2:       .WORD      0                  ;TEMP STORAGE WORD
                                      00  041F   937 TEMP_FLAG:        .BYTE      0                  ;TEMP STORAGE OF SECTION FLAG
                                00000426  0420   938 TEMP_SECTION:     .BLKB      6                  ;TEMP STORAGE OF SECTION NAME
                                      00  0426   939 TEST_NUM:         .BYTE      0                  ;CURRENT TEST NUMBER
                                      00  0427   940 TEST_NUM1:        .BYTE      0                  ;STARTING TEST NUMBER
                                      00  0428   941 TEST_NUM2:        .BYTE      0                  ;ENDING TEST NUMBER
                                      1D  0429   942 TEST_START_A:     .BYTE      29                 ;CHAR COUNT
52 41 54 53 20 47 4E 49 54 53 45 54  042A   943                   .ASCII     "TESTING STARTED - RUN TIME = "
49 54 20 4E 55 52 20 2D 20 44 45 54  0436
               20 3D 20 45 4D  0442
                                      00  0447   944 TEST_ZERO:        .BYTE      0                  ;FLAG 1=EXECUTING TEST 0
                                   0802'  0448   945 TIME_PNT:         .WORD      TIME_TABLE         ;POINTER INTO TEST TIME TABLE
                                    0000  044A   946 TIMOUT_CNT:       .WORD      0                  ;TIME OUT COUNTER
                                      00  044C   947 TRACE:            .BYTE      0                  ;FLAG 1=TRACE MODE
                                    0000  044D   948 TTBUF_PNT:        .WORD      0                  ;POINTER TO TTY INPUT BUFFER
                                      63  044F   949 VERSION:          .BYTE      99                 ;CHAR COUNT
45 42 20 20 20 20 20 2A 2A 2A 2A 0D  0450   950             .ASCII       <CR>"****     BEGIN VAX-11/730,725 AUTO TEST      ****"
37 2F 31 31 2D 58 41 56 20 4E 49 47  045C
20 4F 54 55 41 20 35 32 37 2C 30 33  0468
2A 2A 2A 20 20 20 20 20 54 53 45 54  0474
                                      2A  0480
35 2E 31 20 4E 4F 49 53 52 45 56 0D  0481   951             .ASCII       <CR>"VERSION 1.5 RUN TIME APPROXIMATELY 15:00 MINUTES"<CR>
50 41 20 45 4D 49 54 20 4E 55 52 20  048D
20 59 4C 45 54 41 4D 49 58 4F 52 50  0499
45 54 55 4E 49 4D 20 30 30 3A 35 31  04A5
                                   0D 53  04B1
                                      00  04B3   952 WARM_RESTART:     .BYTE      0                  ;FLAG 1=POWER FAIL RESTART
                                      D0  04B4   953 WARN_MESS:        .BYTE      208                ;CHAR COUNT
53 20 52 45 50 4F 52 50 20 2A 2A 0D  04B5   954                   .ASCII     <CR>"** PROPER SETUP REQUIRED - TYPE <CR> TO "
45 52 49 55 51 45 52 20 50 55 54 45  04C1
52 43 3C 20 45 50 59 54 20 2D 20 44  04CD
                  20 4F 54 20 3E  04D9
   2A 2A 20 45 55 4E 49 54 4E 4F 43  04DE   955                   .ASCII     "CONTINUE **"
20 4B 43 45 48 43 20 20 20 2A 2A 0D  04E9   956                   .ASCII     <CR>"**   CHECK FOR RL02 DIAGNOSTIC PACK "
41 49 44 20 32 30 4C 52 20 52 4F 46  04F5
4B 43 41 50 20 43 49 54 53 4F 4E 47  0501
                                      20  050D
20 20 20 27 4B 43 41 50 44 52 43 27  050E   957                   .ASCII     "'CRDPACK'    **"
                            2A 2A 20  051A
53 4E 49 20 20 20 20 20 20 2A 2A 0D  051D   958                   .ASCII     <CR>"**       INSERTED AND SPINNING IN DRIVE "
50 53 20 44 4E 41 20 44 45 54 52 45  0529
52 44 20 4E 49 20 47 4E 49 4E 4E 49  0535
                     20 45 56 49  0541
2A 2A 20 20 20 20 20 3A 31 41 51 44  0545   959                   .ASCII     "DQA1:      **"
50 55 54 45 53 20 46 49 20 2A 2A 0D  0551   960                   .ASCII     <CR>"** IF SETUP CORRECT, POSSIBLE RL02 DRIVE "
4F 50 20 2C 54 43 45 52 52 4F 43 20  055D
20 32 30 4C 52 20 45 4C 42 49 53 53  0569
               20 45 56 49 52 44  0575
      2A 2A 20 4D 45 4C 42 4F 52 50  057B   961                   .ASCII     "PROBLEM **"
                                      04  0585   962 WCS_A:            .BYTE      4                  ;CHAR COUNT
                         20 53 43 57  0586   963                   .ASCII     "WCS "
                                      00  058A   964 WCS_CALC:         .BYTE      0                  ;FLAG 1=WCS PARITY CALCULATION
                                      00  058B   965 WCS_LOADED:       .BYTE      0                  ;FLAG 1=WCS OVERLAY LOADED
                                      00  058C   966 WCS_PNT:          .BYTE      0                  ;COUNT FOR WCS 3 BYTE LOADS
                                    0000  058D   967 XFER_CNT:         .WORD      0                  ;LONG WORD XFER COUNTER
```

```
                           00000592  058F   968 XFER_DEST:        .BLKB         3                 ;ADDR DATA XFER TO
                                 00  0592   969 XFER_MM:          .BYTE         0                 ;FLAG FOR MM OR LS XFER
                               0000  0593   970 XFER_PNT:         .WORD         0
                                 00  0595   971 ZERO_BYTE:        .BYTE         0
                           0000059A  0596   972 ZERO_WORD:        .BLKB         4
                                 2D  059A   973 warn_mesa:        .byte         45                ;CHAR COUNT
50 59 54 20 32 30 4C 52 20 2A 2A 0D  059B   974                   .ascii        <CR>''** RL02 TYPE 1 <CR> TO CONTINUE TESTING  ''
20 4F 54 20 3E 52 43 3C 20 31 20 45  05A7
53 45 54 20 45 55 4E 49 54 4E 4F 43  05B3
                  20 20 47 4E 49 54  05BF
                           2A 2A 09  05C5   975                   .ascii        ''       **''
                                 68  05C8   976 WARN_MESB:        .BYTE         104               ;CHAR COUNT
20 45 56 49 52 44 20 46 49 2A 2A 0D  05C9   977                   .ASCIl        <CR>''**IF DRIVE 1 IS A TS05 THEN IGNORE ERROR ''
20 35 30 53 54 20 41 20 53 49 20 31  05D5
20 45 52 4F 4E 47 49 20 4E 45 48 54  05E1
                  20 52 4F 52 52 45  05ED
      2A 2A 20 45 47 41 53 53 45 4D  05F3   978                   .ASCII        ''MESSAGE **''
45 50 59 54 20 44 4E 41 20 2A 2A 0D  05FD   979                   .ASCII        <CR>''** AND TYPE 2<CR> TO CONTINUE IF DRIVE 1 ''
4F 43 20 4F 54 20 3E 52 43 3C 32 20  0609
52 44 20 46 49 20 45 55 4E 49 54 4E  0615
                  20 31 20 45 56 49  0621
      2A 2A 20 20 20 20 41 20 53 49  0627   980                   .ASCII        ''IS A    **''
                                 31  0631   981 VERSION_1:        .BYTE         49                  ;CHAR COUNT
54 53 55 43 20 20 20 2A 2A 2A 2A 0D  0632   982          .ASCII          <CR>''****   CUSTOMER RUNNABLE MICRODIAGNOSTICS    ****''
4C 42 41 4E 4E 55 52 20 52 45 4D 4F  063E
4E 47 41 49 44 4F 52 43 49 4D 20 45  064A
2A 2A 2A 20 20 20 53 43 49 54 53 4F  0656
                                 2A  0662
                                     0663   983
                                     0663   984
                                     0663   985
                                     0663   986 ;CSR EXECUTABLE CODE
                                     0663   987 ;NOTE:  THE INSTRUCTIONS THAT ARE PAIRED WITH S_XXXX ARE DYNAMICLY MODIFIED
                                     0663   988 ;       DURING EXECUTION.  THUS THE ADDRESS 0 WAS ASSEMBLED INTO THEM. THIS
                                     0663   989 ;       ADDRESS MY BE MODIFYED
                                     0663   990
                                 01  0663   991 X_READ_LS:        .BYTE         1
                                 36  0664   992                   .BYTE         <^X36>            ;MOV LS[0] TO WR[0]
                                 00  0665   993                   .BYTE         <^X00>
                                 15  0666   994                   .BYTE         <^X15>
                                     0667   995
                                 36  0667   996 S_READ_LS:        .BYTE         <^X36>            ;MOV LS[0] TO WR[0]
                                 00  0668   997                   .BYTE         <^X00>
                                 15  0669   998                   .BYTE         <^X15>
                                     066A   999
                                     066A  1000
                                 01  066A  1001 X_CLR_CPU_ATT:    .BYTE         1                 ;INSTRUCTION COUNT
                                 90  066B  1002                   .BYTE         <^X90>            ;MISC [CLR.CP.ATTN.AND.ACK]
                                 C0  066C  1003                   .BYTE         <^XC0>
                                 15  066D  1004                   .BYTE         <^X15>
                                     066E  1005
                                     066E  1006
                                 01  066E  1007 X_WRITE_LS:       .BYTE         1                 ;INSTRUCTION COUNT
                                 BE  066F  1008                   .BYTE         <^XBE>            ;MOV WR[0] TO LS[0]
                                 00  0670  1009                   .BYTE         <^X00>
                                 15  0671  1010                   .BYTE         <^X15>
                                     0672  1011
```

```
                                   BE  0672   1012 S_WRITE_LS:     .BYTE          <^XBE>           ;MOV WR[0] TO LS[0]
                                   00  0673   1013                 .BYTE          <^X00>
                                   15  0674   1014                 .BYTE          <^X15>
                                       0675   1015
                                       0675   1016
                                       0675   1017
                                       0675   1018 ;*******************************************************************************
                                       0675   1019 ;
                                       0675   1020 ;    INPUT HEX NUMBER AREA
                                       0675   1021 ;
                                       0675   1022 ;*******************************************************************************
                                       0675   1023
                                   04  0675   1024 NUM_SHIFT:      .BYTE          4                ;4 BYTES OF HEX DIGITS
                             0000067A  0676   1025 INPUT_NUM:      .BLKB          4
                                       067A   1026
                                       067A   1027 ;*******************************************************************************
                                       067A   1028 ;
                                       067A   1029 ;    INSTRUCTION STREAM TABLE
                                       067A   1030 ;    THIS TABLE IS THE INSTRUCTION STREAM TO BE USED TO INPUT THE COMMANDS
                                       067A   1031 ;    TO MICMON.  THE BIT 0 OF THE FIRST BYTE BEFORE THE INSTRUCTION IS USED TO
                                       067A   1032 ;    INDICATE WHETHER THE CRD SHOULD PRINT A 'TESTING STARTED' MESSAGE, AND
                                       067A   1033 ;    BIT 1 INDICATES WHETHER TO PRINT THE 'PASSED' MESSAGE UPON COMPLETION.
                                       067A   1034 ;    THE SECOND BYTE BEFORE THE INSTRUCTION IS THE CHARACTER COUNT OF THE
                                       067A   1035 ;    INSTRUCTION.
                                       067A   1036 ;
                                       067A   1037 ;*******************************************************************************
                                       067A   1038
                                   01  067A   1039 INSTR_TABLE:    .BYTE          1
                                   13  067B   1040                 .BYTE          19               ;CHAR COUNT
 20 41 42 4B 4E 45 20 45 53 20 49 44   067C   1041                 .ASCII         "DI SE ENKBA TE 1 4"<CR>
                OD 34 20 31 20 45 54   0688
                                   00  068F   1042                 .BYTE          0
                                   0A  0690   1043                 .BYTE          10               ;CHAR COUNT
       0D 38 20 36 20 45 54 20 49 44   0691   1044                 .ASCII         "DI TE 6 8"<CR>
                                   00  069B   1045                 .BYTE          0
                                   13  069C   1046                 .BYTE          19               ;CHAR COUNT
 20 42 42 4B 4E 45 20 45 53 20 49 44   069D   1047                 .ASCII         "DI SE ENKBB TE 9 D"<CR>
                OD 44 20 39 20 45 54   06A9
                                   00  06B0   1048                 .BYTE          0
                                   0A  06B1   1049                 .BYTE          10               ;CHAR COUNT
       0D 46 20 46 20 45 54 20 49 44   06B2   1050                 .ASCII         "DI TE F F"<CR>
                                   00  06BC   1051                 .BYTE          0
                                   0C  06BD   1052                 .BYTE          12               ;CHAR COUNT
 0D 43 42 4B 4E 45 20 45 53 20 49 44   06BE   1053                 .ASCII         "DI SE ENKBC"<CR>
                                   00  06CA   1054                 .BYTE          0
                                   0C  06CB   1055                 .BYTE          12               ;CHAR COUNT
 0D 44 42 4B 4E 45 20 45 53 20 49 44   06CC   1056                 .ASCII         "DI SE ENKBD"<CR>
                                   00  06D8   1057                 .BYTE          0
                                   0C  06D9   1058                 .BYTE          12               ;CHAR COUNT
 0D 45 42 4B 4E 45 20 45 53 20 49 44   06DA   1059                 .ASCII         "DI SE ENKBE"<CR>
                                   00  06E6   1060                 .BYTE          0
                                   0C  06E7   1061                 .BYTE          12               ;CHAR COUNT
 0D 41 43 4B 4E 45 20 45 53 20 49 44   06E8   1062                 .ASCII         "DI SE ENKCA"<CR>
                                   02  06F4   1063                 .BYTE          2
                                   0C  06F5   1064                 .BYTE          12               ;CHAR COUNT
 0D 42 43 4B 4E 45 20 45 53 20 49 44   06F6   1065                 .ASCII         "DI SE ENKCB"<CR>
                                   03  0702   1066                 .BYTE          3
```

```
                                14  0703   1067                .BYTE          20                       ;CHAR COUNT
20 43 43 4B 4E 45 20 45 53 20 49 44  0704   1068                .ASCII         "DI SE ENKCC TE 1 32"<CR>
            0D 32 33 20 31 20 45 54  0710
                                03  0718   1069                .BYTE          3
                                0C  0719   1070                .BYTE          12                       ;CHAR COUNT
0D 44 43 4B 4E 45 20 45 53 20 49 44  071A   1071                .ASCII         "DI SE ENKCD"<CR>
                                01  0726   1072                .BYTE          1
                                0C  0727   1073                .BYTE          12                       ;CHAR COUNT
0D 45 43 4B 4E 45 20 45 53 20 49 44  0728   1074                .ASCII         "DI SE ENKCE"<CR>
                                02  0734   1075                .BYTE          2
                                0C  0735   1076                .BYTE          12                       ;CHAR COUNT
0D 48 43 4B 4E 45 20 45 53 20 49 44  0736   1077                .ASCII         "DI SE ENKCH"<CR>
                                03  0742   1078                .BYTE          3
                                0C  0743   1079                .BYTE          12                       ;CHAR COUNT
0D 46 43 4B 4E 45 20 45 53 20 49 44  0744   1080                .ASCII         "DI SE ENKCF"<CR>
                                03  0750   1081                .BYTE          3
                                14  0751   1082                .BYTE          20                       ;CHAR COUNT
20 47 43 4B 4E 45 20 45 53 20 49 44  0752   1083                .ASCII         "DI SE ENKCG TE F 10"<CR>
            0D 30 31 20 46 20 45 54  075E
                                01  0766   1084 RETURN_I:      .BYTE          1
                                07  0767   1085                .BYTE          7                        ;CHAR COUNT
               0D 4E 52 55 54 45 52  0768   1086                .ASCII         "RETURN"<CR>
                                     076F   1087
                                     076F   1088 ;*******************************************************************
                                     076F   1089 ;
                                     076F   1090 ;    TEST NAME TABLE
                                     076F   1091 ;    THIS TABLE CONTAINS THE TEXT FOR THE PROGRESS MESSAGES THAT INDICATE
                                     076F   1092 ;    THE TYPE OF TESTING THAT IS BEING DONE.  ALL STRINGS MUST BE 20
                                     076F   1093 ;    CHARACTERS IN LENGTH TO INSURE THAT THE PRINTOUT LINES UP PROPERLY.
                                     076F   1094 ;
                                     076F   1095 ;*******************************************************************
                                     076F   1096
                                14  076F   1097 NAME_TABLE:    .BYTE          20               ;CHAR COUNT
20 31 20 54 52 41 50 20 55 50 43 0D  0770   1098                .ASCII         <CR>"CPU PART 1         "
            20 20 20 20 20 20 20 20  077C
                                14  0784   1099                .BYTE          20
20 20 20 20 20 59 52 4F 4D 45 4D 0D  0785   1100                .ASCII         <CR>"MEMORY             "
            20 20 31 20 20 20 20 20  0791
                                14  0799   1101                .BYTE          20
20 32 20 54 52 41 50 20 55 50 43 0D  079A   1102                .ASCII         <CR>"CPU PART 2         "
            20 20 20 20 20 20 20 20  07A6
                                14  07AE   1103                .BYTE          20
20 20 20 20 20 20 20 20 41 50 46 0D  07AF   1104                .ASCII         <CR>"FPA                "
            20 20 20 20 20 20 20 20  07BB
                                14  07C3   1105                .BYTE          20
20 20 20 20 20 20 30 33 37 42 52 0D  07C4   1106                .ASCII         <CR>"RB730              "
            20 20 20 20 20 20 20 20  07D0
                                14  07D8   1107                .BYTE          20
31 20 54 52 41 50 20 32 30 4C 52 0D  07D9   1108                .ASCII         <CR>"RL02 PART 1   DQA1 "
            20 31 41 51 44 20 20 20  07E5
                                14  07ED   1109 RETURN_N:      .BYTE          20
20 33 20 54 52 41 50 20 55 50 43 0D  07EE   1110                .ASCII         <CR>"CPU PART 3         "
            20 20 20 20 20 20 20 20  07FA
                                     0802   1111
                                     0802   1112 ;*******************************************************************
                                     0802   1113 ;
                                     0802   1114 ;    TEST TIME TABLE
```

```
                    0802  1115 ;  THIS TABLE CONTAINS THE APPROXIMATE RUN TIMES FOR EACH TYPE OF CRD
                    0802  1116 ;  TESTING.  ALL TIMES MUST CONSIST OF A 4 CHARACTER STRING.
                    0802  1117 ;
                    0802  1118 ;*****************************************************************************
                    0802  1119
                04  0802  1120 TIME_TABLE:     .BYTE           4                       ;CHAR COUNT
       30 33 3A 33  0803  1121                 .ASCII          "3:30"
                04  0807  1122                 .BYTE           4
       30 33 3A 31  0808  1123                 .ASCII          "1:30"
                04  080C  1124                 .BYTE           4
       35 34 3A 30  080D  1125                 .ASCII          "0:45"
                04  0811  1126                 .BYTE           4
       35 34 3A 31  0812  1127                 .ASCII          "1:45"
                04  0816  1128                 .BYTE           4
       35 34 3A 30  0817  1129                 .ASCII          "0:45"
                04  081B  1130                 .BYTE           4
       35 31 3A 30  081C  1131                 .ASCII          "0:15"
                04  0820  1132 RETURN_T:       .BYTE           4
       30 30 3A 34  0821  1133                 .ASCII          "4:00"
                    0825  1134
                    0825  1135
                    0825  1136 ;*****************************************************************************
                    0825  1137 ;
                    0825  1138 ;  CRD OPTION TABLE
                    0825  1139 ;  THIS TABLE LISTS THE ASCII TEXT THAT IS TO BE DISPLAYED IN THE EVENT THAT
                    0825  1140 ;  THE DEVICE IS FOUND TO BE BAD.  THE CPU IS NOT INCLUDED.  EACH ENTRY
                    0825  1141 ;  MUST CONSIST OF 7 BYTES.  THE FIRST INDICATES THE CHARACTER COUNT OF
                    0825  1142 ;  THE MODULE NAME.  THE ASCII TEXT COMES NEXT, FOLLOWED A BLOCK OF THE
                    0825  1143 ;  APPROPRIATE SIZE TO MAKE THE ENTRY EQUAL TO 7 BYTES.
                    0825  1144 ;
                    0825  1145 ;*****************************************************************************
                    0825  1146
                03  0825  1147 CRD_OPT_A:      .BYTE           3
          41 50 46  0826  1148                 .ASCII          "FPA"
          0000082C  0829  1149                 .BLKB           3
                06  082C  1150                 .BYTE           6
 59 52 4F 4D 45 4D  082D  1151                 .ASCII          "MEMORY"
                05  0833  1152                 .BYTE           5
    30 33 37 42 52  0834  1153                 .ASCII          "RB730"
                00  0839  1154                 .BYTE           0
                04  083A  1155                 .BYTE           4
       31 41 51 44  083B  1156                 .ASCII          "DQA1"
          00000841  083F  1157                 .BLKB           2
                04  0841  1158                 .BYTE           4
       30 41 51 44  0842  1159                 .ASCII          "DQA0"
                    0846  1160
                    0846  1161
                    0846  1162 ;*****************************************************************************
                    0846  1163 ;
                    0846  1164 ;  BOARD NAME TABLE
                    0846  1165 ;
                    0846  1166 ;*****************************************************************************
                    0846  1167
                01  0846  1168 BOARD_TABLE:    .BYTE           1                       ;BOARD NUMBER
          53 43 57  0847  1169                 .ASCII          "WCS"
                02  084A  1170                 .BYTE           2                       ;BOARD NUMBER
          50 41 44  084B  1171                 .ASCII          "DAP"
```

```
            02  084E   1172                      .BYTE           2                       ;BOARD NUMBER
      55 50 43  084F   1173                      .ASCII          "CPU"
            04  0852   1174                      .BYTE           4                       ;BOARD NUMBER
      54 43 4D  0853   1175                      .ASCII          "MCT"
            08  0856   1176                      .BYTE           8                       ;BOARD NUMBER
      41 50 46  0857   1177                      .ASCII          "FPA"
            10  085A   1178                      .BYTE           <^X10>                  ;BOARD NUMBER
      43 44 49  085B   1179                      .ASCII          "IDC"
            FF  085E   1180                      .BYTE           <^XFF>                  ;END OF BOARD TABLE
                085F   1181
                085F   1182 ;****************************************************************************************
                085F   1183 ;
                085F   1184 ;   SECTION NAME TABLE (NOTE: ALL ENTRIES MUST BE THE SAME NAME LENGTH (6))
                085F   1185 ;   AND ALL FILL CHARS MUST BE ZERO'S (BINARY ZEROS)
                085F   1186 ;   THE BYTE BEFORE EACH NAME IS USED TO SET SECTION FLAG AS FOLLOWS
                085F   1187 ;
                085F   1188 ;   SECTION_FLAG             FF = END OF TABLE
                085F   1189 ;                   BIT 7     0 = NAME IS SECTION NAME FOR WCS
                085F   1190 ;                             1 = NAME IS SECTION NAME FOR CONSOLE RAM
                085F   1191 ;                   BIT 6     1 = OPTIONAL TEST
                085F   1192 ;               BITS 0 - 5   XX = CPU CLUSTER BOARD NUMBER
                085F   1193 ;
                085F   1194 ;
                085F   1195 ;****************************************************************************************
                085F   1196
            83  085F   1197 SEC_TABLE:        .BYTE           <^X83>                  ;8085 BASED CPU TESTS 1-8
41 42 4B 4E 45  0860   1198                   .ASCII          "ENKBA"
            00  0865   1199                   .BYTE           0
                0866   1200
            83  0866   1201                   .BYTE           <^X83>                  ;8085 BASED CPU TESTS 9-F
42 42 4B 4E 45  0867   1202                   .ASCII          "ENKBB"
            00  086C   1203                   .BYTE           0
                086D   1204
            83  086D   1205                   .BYTE           <^X83>                  ;8085 BASED CPU TESTS 10-1D
43 42 4B 4E 45  086E   1206                   .ASCII          "ENKBC"
            00  0873   1207                   .BYTE           0
                0874   1208
            81  0874   1209                   .BYTE           <^X81>                  ;8085 BASED CPU TESTS 1E-26
44 42 4B 4E 45  0875   1210                   .ASCII          "ENKBD"
            00  087A   1211                   .BYTE           0
                087B   1212
            81  087B   1213                   .BYTE           <^X81>                  ;8085 BASED CPU TESTS 27-2E
45 42 4B 4E 45  087C   1214                   .ASCII          "ENKBE"
            00  0881   1215                   .BYTE           0
                0882   1216
            C0  0882   1217                   .BYTE           <^XC0>                  ;8085 BASED WCS MARCH TEST.
46 42 4B 4E 45  0883   1218                   .ASCII          "ENKBF"                 ; (OPTIONAL)
            00  0888   1219                   .BYTE           0
                0889   1220
            C0  0889   1221                   .BYTE           <^XC0>                  ;8085 BASED APT UART TEST
47 42 4B 4E 45  088A   1222                   .ASCII          "ENKBG"                 ; (OPTIONAL)
            00  088F   1223                   .BYTE           0
                0890   1224
            02  0890   1225                   .BYTE           <^X02>                  ;WCS BASED CPU TEST
41 43 4B 4E 45  0891   1226                   .ASCII          "ENKCA"
            00  0896   1227                   .BYTE           0
                0897   1228
```

```
             02  0897  1229                     .BYTE           <^X02>          ;WCS BASED CPU TEST
 42 43 4B 4E 45  0898  1230                     .ASCII          "ENKCB"
             00  089D  1231                     .BYTE           0
                 089E  1232
             04  089E  1233                     .BYTE           <^X04>          ;WCS BASED MCT TEST
 43 43 4B 4E 45  089F  1234                     .ASCII          "ENKCC"
             00  08A4  1235                     .BYTE           0
                 08A5  1236
             02  08A5  1237                     .BYTE           <^X02>          ;WCS BASED CPU TEST
 44 43 4B 4E 45  08A6  1238                     .ASCII          "ENKCD"
             00  08AB  1239                     .BYTE           0
                 08AC  1240
             08  08AC  1241                     .BYTE           <^X08>          ;WCS BASED FPA TEST
 45 43 4B 4E 45  08AD  1242                     .ASCII          "ENKCE"
             00  08B2  1243                     .BYTE           0
                 08B3  1244
             10  08B3  1245                     .BYTE           <^X10>          ;WCS BASED IDC TEST
 46 43 4B 4E 45  08B4  1246                     .ASCII          "ENKCF"
             00  08B9  1247                     .BYTE           0
                 08BA  1248
             10  08BA  1249                     .BYTE           <^X10>          ;WCS BASED IDC TEST
 47 43 4B 4E 45  08BB  1250                     .ASCII          "ENKCG"
             00  08C0  1251                     .BYTE           0
                 08C1  1252
             10  08C1  1253                     .BYTE           <^X10>          ;WCS BASED IDC TEST
 48 43 4B 4E 45  08C2  1254                     .ASCII          "ENKCH"
             00  08C7  1255                     .BYTE           0
                 08C8  1256
             FF  08C8  1257                     .BYTE           <^XFF>          ;END OF TABLE
                 08C9  1258
             00  08C9  1259 SECTION_FLAG:       .BYTE           0               ;SECTION TYPE AND BOARD NUM
       000008D0  08CA  1260 SECTION_NAME:       .BLKB           SEC_LEN         ;SAVE BYTES FOR NAME
                 08D0  1261
                 08D0  1262 ;*******************************************************************************
                 08D0  1263 ;
                 08D0  1264 ;  INPUT BUFFER AREA
                 08D0  1265 ;
                 08D0  1266 ;*******************************************************************************
                 08D0  1267
             00  08D0  1268 TTBUF_CNT:          .BYTE           0               ;CHAR CNT OF INPUT LINE PUT
                 08D1  1269                                                     ; HERE BY GET LINE ROUTINE
       00000921  08D1  1270 TTBUF:              .BLKB           80              ;TTY BUFFER
                 0921  1271
                 0921  1272 ;*******************************************************************************
                 0921  1273 ;
                 0921  1274 ;  UPC VERIFY ADDRESS TABLE
                 0921  1275 ;
                 0921  1276 ;  THIS TABLE OF VALUES IS COMPARED TO ACTUAL UPC VALUES TO VERIFY
                 0921  1277 ;  THE WRITE OF DATA TO THE CPU IS WORKING CORRECTLY
                 0921  1278 ;
                 0921  1279 ;*******************************************************************************
                 0921  1280
           0601  0921  1281 WRITE_TAB:          .WORD           <^X601>
           0602  0923  1282                     .WORD           <^X602>
           0603  0925  1283                     .WORD           <^X603>
           0604  0927  1284                     .WORD           <^X604>
           0606  0929  1285                     .WORD           <^X606>
```

```
    0603  092B  1286                    .WORD      <^X603>
    0605  092D  1287                    .WORD      <^X605>
    0606  092F  1288                    .WORD      <^X606>
          0931  1289 ;***************************************************************************
          0931  1290 ;
          0931  1291 ;  CHAR STRINGS AND JUMP ADDRESSES FOR PARSING AT COMMAND LEVEL
          0931  1292 ;
          0931  1293 ;***************************************************************************
          0931  1294
      02  0931  1295 MAIN_TAB:          .BYTE   2
   49 44  0932  1296                    .ASCII  "DI"                ;DI MUST COME B4 D!!!!!
          0934  1297                    CALL    DIAG_COMMAND        ;DIAGNOSE COMMAND
      CD  0934             .BYTE        ^0315
   0998'  0935             .WORD        <DIAG_COMMAND-HEAD>
          0937  1298                    RET
      C9  0937             .BYTE        ^0311
          0938  1299
      01  0938  1300                    .BYTE   1
      43  0939  1301                    .ASCII  "C"
          093A  1302                    CALL    CONT_COMMAND        ;CONTINUE COMMAND
      CD  093A             .BYTE        ^0315
   0B46'  093B             .WORD        <CONT_COMMAND-HEAD>
          093D  1303                    RET
      C9  093D             .BYTE        ^0311
          093E  1304
      02  093E  1305                    .BYTE   2
   45 52  093F  1306                    .ASCII  "RE"                ;RETURN COMMAND
          0941  1307                    JMP     STNDRD_CON_COM_SUC       ;RETURN TO STANDARD CONSOLE
      C3  0941             .BYTE        ^0303
   0991'  0942             .WORD        <STNDRD_CON_COM_SUC-HEAD>
          0944  1308                    RET
      C9  0944             .BYTE        ^0311
          0945  1309
      02  0945  1310                    .BYTE   2
   44 4C  0946  1311                    .ASCII  "LD"                ;LOAD SECTION (NO EXECUTE)
          0948  1312                    CALL    LOADER
      CD  0948             .BYTE        ^0315
   0B39'  0949             .WORD        <LOADER-HEAD>
          094B  1313                    RET
      C9  094B             .BYTE        ^0311
          094C  1314
      01  094C  1315                    .BYTE   1
      49  094D  1316                    .ASCII  "I"                 ;INIT (EXEC WCS TEST 0)
          094E  1317                    CALL    EXEC_TEST0
      CD  094E             .BYTE        ^0315
   1BA1'  094F             .WORD        <EXEC_TEST0-HEAD>
          0951  1318                    RET
      C9  0951             .BYTE        ^0311
          0952  1319
      02  0952  1320                    .BYTE   2
   42 41  0953  1321                    .ASCII  "AB"                ;ABORT (FUTURE EXPANSION)
          0955  1322                    JMP     START_UP
      C3  0955             .BYTE        ^0303
   1CD2'  0956             .WORD        <START_UP-HEAD>
          0958  1323                    RET
      C9  0958             .BYTE        ^0311
          0959  1324
      01  0959  1325                          .BYTE   1
      0D  095A  1326                          .ASCII  <CR>             ;END ON LINE HAS <CR>
          095B  1327                          RET                      ;FILLER--DO NOT REMOVE!!!
      C9  095B                    .BYTE      ^O311
          095C  1328                          RET                      ;FILLER--DO NOT REMOVE!!!
      C9  095C                    .BYTE      ^O311
          095D  1329                          RET                      ;FILLER--DO NOT REMOVE!!!
      C9  095D                    .BYTE      ^O311
          095E  1330                          RET
      C9  095E                    .BYTE      ^O311
          095F  1331
      FF  095F  1332                          .BYTE   <^XFF>           ;END OF TABLE
          0960  1333
          0960  1334 ;************************************************************************
          0960  1335 ;
          0960  1336 ;  CHAR STRINGS AND JUMP ADDRESSES FOR PARSING THE DIAGNOSE COMMAND
          0960  1337 ;
          0960  1338 ;************************************************************************
          0960  1339
      02  0960  1340 DIAG_TAB:                .BYTE   2
   4F 42  0961  1341                          .ASCII  "BO"
          0963  1342                          CALL    DIAG_BOARD       ;DIAGNOSE BOARD
      CD  0963                    .BYTE      ^O315
  0A0F'   0964                    .WORD      <DIAG_BOARD-HEAD>
          0966  1343                          RET
      C9  0966                    .BYTE      ^O311
          0967  1344
      02  0967  1345                          .BYTE   2
   45 53  0968  1346                          .ASCII  "SE"
          096A  1347                          CALL    DIAG_SECTION     ;DIAGNOSE SECTION
      CD  096A                    .BYTE      ^O315
  0A5D'   096B                    .WORD      <DIAG_SECTION-HEAD>
          096D  1348                          RET
      C9  096D                    .BYTE      ^O311
          096E  1349
      02  096E  1350                          .BYTE   2
   45 54  096F  1351                          .ASCII  "TE"
          0971  1352                          CALL    DIAG_TEST        ;DIAGNOSE TEST
      CD  0971                    .BYTE      ^O315
  0ACA'   0972                    .WORD      <DIAG_TEST-HEAD>
          0974  1353                          RET
      C9  0974                    .BYTE      ^O311
          0975  1354
      02  0975  1355                          .BYTE   2
   4F 43  0976  1356                          .ASCII  "CO"
          0978  1357                          CALL    DIAG_CONTIN      ;DIAGNOSE CONTINUE
      CD  0978                    .BYTE      ^O315
  0B0E'   0979                    .WORD      <DIAG_CONTIN-HEAD>
          097B  1358                          RET
      C9  097B                    .BYTE      ^O311
          097C  1359
      02  097C  1360                          .BYTE   2
   41 50  097D  1361                          .ASCII  "PA"
          097F  1362                          CALL    DIAG_PASS        ;DIAGNOSE PASS
      CD  097F                    .BYTE      ^O315
  0B14'   0980                    .WORD      <DIAG_PASS-HEAD>
          0982  1363                          RET
      C9  0982                    .BYTE   ^0311
          0983  1364
      01  0983  1365                      .BYTE   1
      00  0984  1366                      .BYTE   0               ;END OF LINE HAS 0 AFTER <CR>
          0985  1367                      CALL    SET_PARDONE
      CD  0985                    .BYTE   ^0315
   1C06'  0986                    .WORD   <SET_PARDONE-HEAD>
          0988  1368                      RET
      C9  0988                    .BYTE   ^0311
          0989  1369
      FF  0989  1370                      .BYTE   <^XFF>          ;END OF TABLE
          098A  1371
          098A  1372
          098A  1373 BEGIN_CHECKSUM:
          098A  1374 ;*******************************************************************************
          098A  1375 ;
          098A  1376 ;  COMMAND SUBROUTINES
          098A  1377 ;
          098A  1378 ;*******************************************************************************
          098A  1379
          098A  1380 ;*******************************************************************************
          098A  1381 ;
          098A  1382 ;        STNDRD_CON_COM
          098A  1383 ;        THIS ROUTINE IS ENTERED IF A RE, T/E, OR S/U 0 COMMAND IS ISSUED
          098A  1384 ;        FROM THE CONSOLE DEVICE.  IT WILL INITIALIZE THE INTERVAL TIMER
          098A  1385 ;        BY DOING A MASTER RESET TO IT AND THEN GO TO ROM ADDRESS 0.
          098A  1386 ;
          098A  1387 ;*******************************************************************************
          098A  1388
          098A  1389 STNDRD_CON_COM:
          098A  1390                      LXI     H,CRD_FLAGS     ;SET BIT 2 OF CRD_FLAGS TO INDICATE
      21  098A                    .BYTE   <H*8> ! 1
   40 FD  098B                    .BYTE   <CRD_FLAGS-HEAD>&255 , <<CRD_FLAGS-HEAD>&^XFF00>/256
          098D  1391                      MVI     A,HEX_4         ; UNSUCCESSFUL CRD RUN
   04 3E  098D                    .BYTE   <A*8> ! 6 , HEX_4&255
          098F  1392                      ORA     M
      B6  098F                    .BYTE   ^0260 ! M
          0990  1393                      MOV     M,A
      77  0990                    .BYTE   ^0100 ! <M*8> ! A
          0991  1394
          0991  1395 STNDRD_CON_COM_SUC:
          0991  1396                      MVI     A,HEX_FF        ;LOAD ACCUM WITH FF
   FF 3E  0991                    .BYTE   <A*8> ! 6 , HEX_FF&255
          0993  1397                      OUT     ITCSR           ;SEND FF TO INTERVAL TIMER (MASTER
   1D D3  0993                    .BYTE   ^0323 , ITCSR&255       ;register A
          0995  1398                                              ; RESET)
          0995  1399                      JMP     RET_VECTOR      ;RETURN TO CONSOLE
      C3  0995                    .BYTE   ^0303
    414D  0996                    .WORD   <RET_VECTOR-HEAD>
          0998  1400
          0998  1401
          0998  1402 ;*******************************************************************************
          0998  1403 ;
          0998  1404 ;  DIAG_COMMAND
          0998  1405 ;  THE DIAGNOSE COMMAND CAUSES EXECUTION OF DIAGNOSTICS IN ONE OF THE
          0998  1406 ;  FOLLOWING MODES
          0998  1407 ;        1) BY THE DIAGNOSTIC NAME
```

```
                0998  1408 ;           2) BY THE MODULE NAME
                0998  1409 ;           3) ALL NON-OPTIONAL DIAGNOSTICS
                0998  1410 ;
                0998  1411 ;******************************************************************************
                0998  1412
                0998  1413 DIAG_COMMAND:   IF      CONTINUE
          3A    0998                .BYTE   ^072
       003A'    0999                .WORD   <CONTINUE-HEAD>
          0F    099B                .BYTE   ^017
          D2    099C                .BYTE   ^0322
       09AF'    099D                .WORD   <2001$-HEAD>
                099F  1414
                099F  1415                  CLEAR   CONTINUE                        ;THIS COMMAND IS ILLEGAL IN
          AF    099F                .BYTE   ^0250 ! A                 ;with A
          32    09A0                .BYTE   ^062
       003A'    09A1                .WORD   <CONTINUE-HEAD>
                09A3  1416                  SET     RESTART                         ; CONT MODE SO PUT BACK TO
          AF    09A3                .BYTE   ^0250 ! A                 ;with A
          3C    09A4                .BYTE   ^04 ! <8*A>
          32    09A5                .BYTE   ^062
       03F1'    09A6                .WORD   <RESTART-HEAD>
                09A8  1417                                                          ; NORMAL MODE AND RESTART PROG
                09A8  1418                  LXI     H,TTBUF                         ; BACK AT PARSER SO STACK
          21    09A8                .BYTE   <H*8> ! 1
      08'D1'    09A9                .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
                09AB  1419                  SHLD    TTBUF_PNT                       ; WILL REFLECT A NORMAL ENTRY
          22    09AB                .BYTE   ^042
       044D'    09AC                .WORD   <TTBUF_PNT-HEAD>
                09AE  1420
                09AE  1421                  RET
          C9    09AE                .BYTE   ^0311
                09AF  1422
                09AF  1423                  ENDIF
                09AF       2001$:                                                   ;GENERATE LCL 2001 NAME
                09AF  1424
                09AF  1425                  MVI     B,APT_C_DEF                     ;GET BIT TO CLEAR FOR NO APT
       DF 06    09AF                .BYTE   <B*8> ! 6 , APT_C_DEF&255
                09B1  1426                  CALL    CLEAR_LS_STAT                   ;CLEAR LS ERROR CONTROL BIT
          CD    09B1                .BYTE   ^0315
       12D8'    09B2                .WORD   <CLEAR_LS_STAT-HEAD>
                09B4  1427
                09B4  1428                  LDA     APT_MEM_SIZE                    ;GET MEM SIZE THAT APT SENT
          3A    09B4                .BYTE   ^072
       001C'    09B5                .WORD   <APT_MEM_SIZE-HEAD>
                09B7  1429                  STA     DATA3                           ;PUT IN BYTE 0 STORAGE
          32    09B7                .BYTE   ^062
       00AC'    09B8                .WORD   <DATA3-HEAD>
                09BA  1430                  LDA     APT_HARD_FLG                    ;GET APT HARDWARE CONFIG
          3A    09BA                .BYTE   ^072
       001D'    09BB                .WORD   <APT_HARD_FLG-HEAD>
                09BD  1431                  STA     DATA2                           ;PUT IN BYTE 1 STORAGE
          32    09BD                .BYTE   ^062
       00AB'    09BE                .WORD   <DATA2-HEAD>
                09C0  1432                  LDA     APT_SOFT_FLG                    ;GET APT SOFTWARE CONFIG
          3A    09C0                .BYTE   ^072
       001E'    09C1                .WORD   <APT_SOFT_FLG-HEAD>
                09C3  1433                  STA     DATA1                           ;PUT IN BYTE 2 STORAGE
```

```
     32  09C3             .BYTE   ^062
  00AA'  09C4             .WORD   <DATA1-HEAD>
         09C6   1434              LDA     APT_SOFT_FLG+1                  ;GET APT RESERVED BYTE
     3A  09C6             .BYTE   ^072
  001F'  09C7             .WORD   <APT_SOFT_FLG+1-HEAD>
         09C9   1435              STA     DATA0                           ;PUT IN BYTE 3 STORAGE
     32  09C9             .BYTE   ^062
  00A9'  09CA             .WORD   <DATA0-HEAD>
         09CC   1436
         09CC   1437              MVI     A,APT_PARAM                     ;LS LOCATION TO WRITE
  49 3E  09CC             .BYTE   <A*8> ! 6 , APT_PARAM&255
         09CE   1438              CALL    WRITE_LS_R                      ;WRITE INTO LS
     CD  09CE             .BYTE   ^0315
  1146'  09CF             .WORD   <WRITE_LS_R-HEAD>
         09D1   1439
         09D1   1440              SET     EXECUTE                         ;CAUSES EXIT OF PARSER
     AF  09D1             .BYTE   ^0250 ! A                   ;with A
     3C  09D2             .BYTE   ^04 ! <8*A>
     32  09D3             .BYTE   ^062
  02EA'  09D4             .WORD   <EXECUTE-HEAD>
         09D6   1441
         09D6   1442              MVI     A,2
  02 3E  09D6             .BYTE   <A*8> ! 6 , 2&255
         09D8   1443              STA     TABLE_MODE                      ;SET TO ALL SECTION MODE(D)
     32  09D8             .BYTE   ^062
  040B'  09D9             .WORD   <TABLE_MODE-HEAD>
         09DB   1444
         09DB   1445              LXI     H,SEC_TABLE
     21  09DB             .BYTE   <H*8> ! 1
08'5F'   09DC             .BYTE   <SEC_TABLE-HEAD>&255 , <<SEC_TABLE-HEAD>&^XFF00>/256
         09DE   1446              SHLD    TABLE_PNT                       ;RESET TABLE POINTER
     22  09DE             .BYTE   ^042
  040C'  09DF             .WORD   <TABLE_PNT-HEAD>
         09E1   1447
         09E1   1448              CALL    SET_ALL_TESTS                   ;SET UP TEST NUM FOR ALL
     CD  09E1             .BYTE   ^0315
  1EBA'  09E2             .WORD   <SET_ALL_TESTS-HEAD>
                                                                          ; TESTS AND CLEAR EOS FLG
         09E4   1449
         09E4   1450              XRA     A
     AF  09E4             .BYTE   ^0250 ! A                   ;with A
         09E5   1451              STA     PASS_CNT
     32  09E5             .BYTE   ^062
  03EA'  09E6             .WORD   <PASS_CNT-HEAD>
         09E8   1452              INR     A                               ;A NOW CONTAINS 1
     3C  09E8             .BYTE   ^04 ! <8*A>
         09E9   1453              STA     PASS_CNT+1                      ;SET TO 1 PASS (DEFAULT)
     32  09E9             .BYTE   ^062
  03EB'  09EA             .WORD   <PASS_CNT+1-HEAD>
         09EC   1454
         09EC   1455              CLEAR   APT_PASS_CNT                    ;INIT MAILBOX PASS CNT
     AF  09EC             .BYTE   ^0250 ! A                   ;with A
     32  09ED             .BYTE   ^062
  0018'  09EE             .WORD   <APT_PASS_CNT-HEAD>
         09F0   1456              CLEAR   APT_PASS_CNT+1                  ;TO 0
     AF  09F0             .BYTE   ^0250 ! A                   ;with A
     32  09F1             .BYTE   ^062
  0019'  09F2             .WORD   <APT_PASS_CNT+1-HEAD>
```

```
         09F4  1457                    CLEAR   PARDONE                  ;RESET RE-ENTRY PARSING FLAG
    AF   09F4              .BYTE       ^0250 ! A             ;with A
    32   09F5              .BYTE       ^062
 03D9'   09F6              .WORD       <PARDONE-HEAD>
         09F8  1458                    CLEAR   MICRO_STEP               ;SET TO NO MICRO STEPPING
    AF   09F8              .BYTE       ^0250 ! A             ;with A
    32   09F9              .BYTE       ^062
 038A'   09FA              .WORD       <MICRO_STEP-HEAD>
         09FC  1459
         09FC  1460 1$:                LXI     H,DIAG_TAB               ;PARSE DIAG COMMAND LINE
    21   09FC              .BYTE       <H*8> ! 1
09'60'   09FD              .BYTE       <DIAG_TAB-HEAD>&255 , <<DIAG_TAB-HEAD>&^XFF00>/256
         09FF  1461                    CALL    PAR_TEMP_BUF             ;UNTIL ERROR OR <CR>
    CD   09FF              .BYTE       ^0315
 1D6B'   0A00              .WORD       <PAR_TEMP_BUF-HEAD>
         0A02  1462
         0A02  1463                    LDA     PARDONE                  ;GET FLAG
    3A   0A02              .BYTE       ^072
 03D9'   0A03              .WORD       <PARDONE-HEAD>
         0A05  1464                    ORA     A                        ;SET CONDITION CODES
    B7   0A05              .BYTE       ^0260 ! A
         0A06  1465                    RNZ                              ;RETURN IF PARDONE (<CR>)
    C0   0A06              .BYTE       ^0300
         0A07  1466
         0A07  1467                    LDA     NOT_FOUND                ;GET NOT FOUND FLAG
    3A   0A07              .BYTE       ^072
 03C2'   0A08              .WORD       <NOT_FOUND-HEAD>
         0A0A  1468                    ORA     A                        ;SET CONDITION CODES
    B7   0A0A              .BYTE       ^0260 ! A
         0A0B  1469                    RNZ                              ;RET IF NOT FOUND
    C0   0A0B              .BYTE       ^0300
         0A0C  1470
         0A0C  1471                    JMP     1$
    C3   0A0C              .BYTE       ^0303
 09FC'   0A0D              .WORD       <1$-HEAD>
         0A0F  1472
         0A0F  1473 ;***********************************************************************
         0A0F  1474 ;
         0A0F  1475 ;    DIAG_BOARD
         0A0F  1476 ;    THIS ROUTINE INPUTS A BOARD NAME WHILE PARSING THE DIAGNOSE COMMAND
         0A0F  1477 ;    THIS BOARD NAME IS THEN LOOKED UP ON A TABLE AND A BOARD NUMBER IS
         0A0F  1478 ;    FOUND. TABLE MODE WILL BE SET SO THAT ONLY SECTION NAMES WITH MATCHING
         0A0F  1479 ;    BOARD NUMBERS WILL BE USED.  THE TABLE WILL BE AS FOLLOWS
         0A0F  1480 ;
         0A0F  1481 ;         NUMBER  NAME
         0A0F  1482 ;
         0A0F  1483 ;         1       WCS (M8394)
         0A0F  1484 ;         2       DAP OR CPU (M8390)
         0A0F  1485 ;         4       MCT (M8391)
         0A0F  1486 ;         8       FPA (M8389)
         0A0F  1487 ;         10      IDC (M8388)
         0A0F  1488 ;
         0A0F  1489 ;          FF (TERMINATOR)
         0A0F  1490 ;
         0A0F  1491 ;***********************************************************************
         0A0F  1492
         0A0F  1493 DIAG_BOARD:        LHLD    TTBUF_PNT
```

```
     2A  0A0F                .BYTE   ^052
  044D'  0A10                .WORD   <TTBUF_PNT-HEAD>
         0A12   1494                 SHLD    TEMP_WORD                  ;SAVE POINTER TO BOARD NAME
     22  0A12                .BYTE   ^042
  0419'  0A13                .WORD   <TEMP_WORD-HEAD>
         0A15   1495                 CALL    SKIP_TO_SPEC               ;SKIP OVER IT TO GET COUNT AND
     CD  0A15                .BYTE   ^0315
  0E33'  0A16                .WORD   <SKIP_TO_SPEC-HEAD>
         0A18   1496                 LHLD    TEMP_WORD                  ;MOVE BOARD NAME TO SAVE AREA
     2A  0A18                .BYTE   ^052
  0419'  0A19                .WORD   <TEMP_WORD-HEAD>
         0A1B   1497                 LXI     D,BOARD_NAME
     11  0A1B                .BYTE   <D*8> ! 1
02'41'   0A1C                .BYTE   <BOARD_NAME-HEAD>&255 , <<BOARD_NAME-HEAD>&^XFF00>/256
         0A1E   1498                 CALL    MOVER_3_R
     CD  0A1E                .BYTE   ^0315
  0F5F'  0A1F                .WORD   <MOVER_3_R-HEAD>
         0A21   1499
         0A21   1500                 LXI     H,BOARD_TABLE
     21  0A21                .BYTE   <H*8> ! 1
08'46'   0A22                .BYTE   <BOARD_TABLE-HEAD>&255 , <<BOARD_TABLE-HEAD>&^XFF00>/256
         0A24   1501                 SHLD    BOARD_PNT                  ;SET BOARD TABLE POINTER
     22  0A24                .BYTE   ^042
  024E'  0A25                .WORD   <BOARD_PNT-HEAD>
         0A27   1502
         0A27   1503                 SET     TABLE_MODE                 ;BOARD MODE
     AF  0A27                .BYTE   ^0250 ! A                  ;with A
     3C  0A28                .BYTE   ^04 ! <8*A>
     32  0A29                .BYTE   ^062
  040B'  0A2A                .WORD   <TABLE_MODE-HEAD>
         0A2C   1504
         0A2C   1505 1$:             LHLD    BOARD_PNT                  ;MOVE ENTRY IN BOARD TABLE
     2A  0A2C                .BYTE   ^052
  024E'  0A2D                .WORD   <BOARD_PNT-HEAD>
         0A2F   1506                 LXI     D,BOARD_BUF                ;TO BUFFER AREA
     11  0A2F                .BYTE   <D*8> ! 1
02'47'   0A30                .BYTE   <BOARD_BUF-HEAD>&255 , <<BOARD_BUF-HEAD>&^XFF00>/256
         0A32   1507                 CALL    MOVER_4_R
     CD  0A32                .BYTE   ^0315
  0F73'  0A33                .WORD   <MOVER_4_R-HEAD>
         0A35   1508                 SHLD    BOARD_PNT                  ;UPDATE BOARD TABLE POINTER
     22  0A35                .BYTE   ^042
  024E'  0A36                .WORD   <BOARD_PNT-HEAD>
         0A38   1509
         0A38   1510                 IFEQI   BOARD_BUF,HEX_FF           ;END OF TABLE?
     3A  0A38                .BYTE   ^072
  0247'  0A39                .WORD   <BOARD_BUF-HEAD>
     FE  0A3B                .BYTE   ^0376
     FF  0A3C                .BYTE   HEX_FF
     C2  0A3D                .BYTE   ^0302
  0A45'  0A3E                .WORD   <2002$-HEAD>
         0A40   1511                 MVI     B,<^X01>                   ;BOARD NOT FOUND
  01 06  0A40                .BYTE   <B*8> ! 6 , ^X01&255
         0A42   1512                 JMP     ERROR_ROUTINE_NO_RET       ;REPORT ERROR, DON'T RETURN
     C3  0A42                .BYTE   ^0303
  0C45'  0A43                .WORD   <ERROR_ROUTINE_NO_RET-HEAD>
         0A45   1513                 ENDIF
```

```
          0A45  2002$:                                            ;GENERATE LCL 2002 NAME
          0A45
          0A45                      IFEQ    BOARD_NAME,BOARD_BUF+1,3 ;COMPARE BOARD TO NAME GIVEN
      21  0A45              .BYTE   <H*8> ! 1
  02'41'  0A46              .BYTE   <BOARD_NAME-HEAD>&255 , <<BOARD_NAME-HEAD>&^XFF00>/256
      11  0A48              .BYTE   <D*8> ! 1
  02'48'  0A49              .BYTE   <BOARD_BUF+1-HEAD>&255 , <<BOARD_BUF+1-HEAD>&^XFF00>/256
   03 0E  0A4B              .BYTE   <C*8> ! 6 , 3&255
      CD  0A4D              .BYTE   ^0315
   00CF'  0A4E              .WORD   <COMPARE-HEAD>
      C2  0A50              .BYTE   ^0302
   0A5A'  0A51              .WORD   <2003$-HEAD>
          0A53
          0A53                      LDA     BOARD_BUF                 ;EQUAL SAVE BOARD #
      3A  0A53              .BYTE   ^072
   0247'  0A54              .WORD   <BOARD_BUF-HEAD>
          0A56                      STA     BOARD_NUM
      32  0A56              .BYTE   ^062
   024D'  0A57              .WORD   <BOARD_NUM-HEAD>
          0A59                      RET                               ;DONE
      C9  0A59              .BYTE   ^0311
          0A5A
          0A5A                      ENDIF
          0A5A  2003$:                                            ;GENERATE LCL 2003 NAME
          0A5A
          0A5A                      JMP     1$                        ;LOOP UNTIL ERROR OR BOARD
      C3  0A5A              .BYTE   ^0303
   0A2C'  0A5B              .WORD   <1$-HEAD>
          0A5D                                                    ; FOUND
          0A5D
          0A5D  ;***********************************************************************
          0A5D  ;
          0A5D  ;   DIAG_SECTION
          0A5D  ;   THIS SUBROUTINE GETS THE SECTION PARAMETER OF A DIAGNOSE COMMAND
          0A5D  ;   AND LOOKS IT UP IN A TABLE TO SEE WHETHER IT IS A CPU MICRO CODE
          0A5D  ;   OR AN 8085 DIAGNOSTIC.  IF THE NAME IS NOT FOUND IN THE TABLE IT
          0A5D  ;   IS ASSUMED TO BE A CPU MICRO CODE DIAGNOSTIC.  THE SECTION IS THEN
          0A5D  ;   LOADED INTO THE APPROPRIATE AREA.
          0A5D  ;
          0A5D  ;***********************************************************************
          0A5D
          0A5D  DIAG_SECTION:       CLEAR   TABLE_MODE                ;SET FOR NO TABLE USAGE
      AF  0A5D              .BYTE   ^0250 ! A               ;with A
      32  0A5E              .BYTE   ^062
   040B'  0A5F              .WORD   <TABLE_MODE-HEAD>
          0A61
          0A61                      ZERO    TEMP_SECTION,SEC_LEN      ;START WITH CLEAR FIELD
      21  0A61              .BYTE   <H*8> ! 1
  04'20'  0A62              .BYTE   <TEMP_SECTION-HEAD>&255 , <<TEMP_SECTION-HEAD>&^XFF00>/256
   06 0E  0A64              .BYTE   <C*8> ! 6 , SEC_LEN&255
      AF  0A66              .BYTE   ^0250 ! A               ;with A
          0A67  2004$:              MOV     M,A
      77  0A67              .BYTE   ^0100 ! <M*8> ! A
      23  0A68              .BYTE   <H*8> ! 3
      0D  0A69              .BYTE   ^05 ! <8*C>
      C2  0A6A              .BYTE   ^0302
   0A67'  0A6B              .WORD   <2004$-HEAD>
```

```
          0A6D
          0A6D                    LHLD    TTBUF_PNT
      2A  0A6D          .BYTE     ^052
   044D'  0A6E          .WORD     <TTBUF_PNT-HEAD>
          0A70                    SHLD    TEMP_WORD                   ;SAVE POINTER TO SECTION
      22  0A70          .BYTE     ^042
   0419'  0A71          .WORD     <TEMP_WORD-HEAD>
          0A73                    CALL    SKIP_TO_SPEC                ;SKIP OVER IT TO GET COUNT
      CD  0A73          .BYTE     ^0315
   0E33'  0A74          .WORD     <SKIP_TO_SPEC-HEAD>
          0A76                    LHLD    TEMP_WORD                   ;MOVE NAME TO SAVE AREA
      2A  0A76          .BYTE     ^052
   0419'  0A77          .WORD     <TEMP_WORD-HEAD>
          0A79                    LXI     D,TEMP_SECTION
      11  0A79          .BYTE     <D*8> ! 1
  04'20'  0A7A          .BYTE     <TEMP_SECTION-HEAD>&255 , <<TEMP_SECTION-HEAD>&^XFF00>/256
          0A7C                    LDA     SKIP_CNT
      3A  0A7C          .BYTE     ^072
   0406'  0A7D          .WORD     <SKIP_CNT-HEAD>
          0A7F                    MOV     C,A                         ;SECT NAME LENGTH
      4F  0A7F          .BYTE     ^0100 ! <C*8> ! A
          0A80                    CALL    MOVER_R
      CD  0A80          .BYTE     ^0315
   0F75'  0A81          .WORD     <MOVER_R-HEAD>
          0A83
          0A83                    LXI     H,SEC_TABLE
      21  0A83          .BYTE     <H*8> ! 1
  08'5F'  0A84          .BYTE     <SEC_TABLE-HEAD>&255 , <<SEC_TABLE-HEAD>&^XFF00>/256
          0A86                    SHLD    TABLE_PNT                   ;RESET TABLE POINTER
      22  0A86          .BYTE     ^042
   040C'  0A87          .WORD     <TABLE_PNT-HEAD>
          0A89
          0A89  1$:               LHLD    TABLE_PNT                   ;MOVE ENTRY IN SEC TABLE TO
      2A  0A89          .BYTE     ^052
   040C'  0A8A          .WORD     <TABLE_PNT-HEAD>
          0A8C                    LXI     D,SECTION_FLAG              ;BUFFER AREA
      11  0A8C          .BYTE     <D*8> ! 1
  08'C9'  0A8D          .BYTE     <SECTION_FLAG-HEAD>&255 , <<SECTION_FLAG-HEAD>&^XFF00>/256
          0A8F                    MVI     C,SEC_LEN+1                 ;COUNT
   07 0E  0A8F          .BYTE     <C*8> ! 6 , SEC_LEN+1&255
          0A91                    CALL    MOVER_R
      CD  0A91          .BYTE     ^0315
   0F75'  0A92          .WORD     <MOVER_R-HEAD>
          0A94                    SHLD    TABLE_PNT                   ;UPDATE SECTION TABLE POINTER
      22  0A94          .BYTE     ^042
   040C'  0A95          .WORD     <TABLE_PNT-HEAD>
          0A97
          0A97                    IFEQI   SECTION_FLAG,HEX_FF         ;END OF TABLE
      3A  0A97          .BYTE     ^072
   08C9'  0A98          .WORD     <SECTION_FLAG-HEAD>
      FE  0A9A          .BYTE     ^0376
      FF  0A9B          .BYTE     HEX_FF
      C2  0A9C          .BYTE     ^0302
   0AB5'  0A9D          .WORD     <2005$-HEAD>
          0A9F
          0A9F                    CLEAR   SECTION_FLAG                ;MAKE WCS DEFAULT AREA
      AF  0A9F          .BYTE     ^0250 ! A               ;with A
      32  0AA0                    .BYTE   ^062
   08C9'  0AA1                    .WORD   <SECTION_FLAG-HEAD>
          0AA3   1562                     LXI     H,TEMP_SECTION           ;NAME IS NOT FOUND IN TABLE
      21  0AA3                    .BYTE   <H*8> ! 1
 04'20'   0AA4                    .BYTE   <TEMP_SECTION-HEAD>&255 , <<TEMP_SECTION-HEAD>&^XFF00>/256
          0AA6   1563                     LXI     D,SECTION_NAME           ;SO LOAD IT INTO WCS IF IT
      11  0AA6                    .BYTE   <D*8> ! 1
 08'CA'   0AA7                    .BYTE   <SECTION_NAME-HEAD>&255 , <<SECTION_NAME-HEAD>&^XFF00>/256
          0AA9   1564                     MVI     C,SEC_LEN                ;IS FOUND ON THE TAPE
   06 0E  0AA9                    .BYTE   <C*8> ! 6 , SEC_LEN&255
          0AAB   1565                     CALL    MOVER_R
      CD  0AAB                    .BYTE   ^0315
   0F75'  0AAC                    .WORD   <MOVER_R-HEAD>
          0AAE   1566
          0AAE   1567                     CALL    LOAD_SECTION
      CD  0AAE                    .BYTE   ^0315
   1A8B'  0AAF                    .WORD   <LOAD_SECTION-HEAD>
          0AB1   1568                     RET                              ;EXIT FROM SEARCH LOOP
      C9  0AB1                    .BYTE   ^0311
          0AB2   1569
          0AB2   1570                     ELSE
      C3  0AB2                    .BYTE   ^0303
   0AC7'  0AB3                    .WORD   <2006$-HEAD>
          0AB5           2005$:                                            ;GENERATE LOCAL SYMBOL NAME
          0AB5   1571
          0AB5   1572                     IFEQ    TEMP_SECTION,SECTION_NAME,SEC_LEN
      21  0AB5                    .BYTE   <H*8> ! 1
 04'20'   0AB6                    .BYTE   <TEMP_SECTION-HEAD>&255 , <<TEMP_SECTION-HEAD>&^XFF00>/256
      11  0AB8                    .BYTE   <D*8> ! 1
 08'CA'   0AB9                    .BYTE   <SECTION_NAME-HEAD>&255 , <<SECTION_NAME-HEAD>&^XFF00>/256
   06 0E  0ABB                    .BYTE   <C*8> ! 6 , SEC_LEN&255
      CD  0ABD                    .BYTE   ^0315
   00CF'  0ABE                    .WORD   <COMPARE-HEAD>
      C2  0AC0                    .BYTE   ^0302
   0AC7'  0AC1                    .WORD   <2007$-HEAD>
          0AC3   1573
          0AC3   1574                     CALL    LOAD_SECTION
      CD  0AC3                    .BYTE   ^0315
   1A8B'  0AC4                    .WORD   <LOAD_SECTION-HEAD>
          0AC6   1575                     RET                              ;EXIT FROM SEARCH LOOP
      C9  0AC6                    .BYTE   ^0311
          0AC7   1576
          0AC7   1577                     ENDIF
          0AC7           2007$:                                            ;GENERATE LCL 2007 NAME
          0AC7   1578
          0AC7   1579                     ENDIF
          0AC7           2006$:                                            ;GENERATE LCL 2006 NAME
          0AC7   1580
          0AC7   1581                     JMP     1$                       ;LOOP UNTIL SECTION FOUND
      C3  0AC7                    .BYTE   ^0303
   0A89'  0AC8                    .WORD   <1$-HEAD>
          0ACA   1582
          0ACA   1583  ;*************************************************************************
          0ACA   1584  ;
          0ACA   1585  ;   DIAG_TEST
          0ACA   1586  ;   THIS SUBROUTINE INPUTS THE TEST PARAMETERS OF THE DIAGNOSE KEYWORD
          0ACA   1587  ;   ONE TEST NUMBER MEANS EXECUTE THAT TEST ONLY
```

```
             0ACA  1588 ;  TWO TEST NUMBERS MEANS EXECUTE THE TESTS BETWEEN THAT RANGE INCLUSIVE
             0ACA  1589 ;
             0ACA  1590 ;***************************************************************************
             0ACA  1591
             0ACA  1592 DIAG_TEST:          IFN     CONSOLE_TEST                    ;IF CONSOLE TEST, SKIP THIS
       3A    0ACA               .BYTE       ^072
    0255'    0ACB               .WORD       <CONSOLE_TEST-HEAD>
       0F    0ACD               .BYTE       ^017
       DA    0ACE               .BYTE       ^0332
    0AE1'    0ACF               .WORD       <2008$-HEAD>
             0AD1  1593
             0AD1  1594                     IFN     WCS_LOADED                      ;ELSE SEE IF WCS LOADED
       3A    0AD1               .BYTE       ^072
    058B'    0AD2               .WORD       <WCS_LOADED-HEAD>
       0F    0AD4               .BYTE       ^017
       DA    0AD5               .BYTE       ^0332
    0AE1'    0AD6               .WORD       <2009$-HEAD>
             0AD8  1595                                                             ; IF NOT, REPORT ERROR
             0AD8  1596                     CLEAR   EXECUTE                         ;CLEAR EXECUTE FLAG TO PROMPT
       AF    0AD8               .BYTE       ^0250 ! A               ;with A
       32    0AD9               .BYTE       ^062
    02EA'    0ADA               .WORD       <EXECUTE-HEAD>
             0ADC  1597                     MVI     B,<^X28>                        ;CODE FOR NO TEST CODE ERROR
    28 06    0ADC               .BYTE       <B*8> ! 6 , ^X28&255
             0ADE  1598                     JMP     ERROR_ROUTINE_NO_RET            ;REPORT ERROR
       C3    0ADE               .BYTE       ^0303
    0C45'    0ADF               .WORD       <ERROR_ROUTINE_NO_RET-HEAD>
             0AE1  1599                     ENDIF
             0AE1        2009$:                                                     ;GENERATE LCL 2009 NAME
             0AE1  1600
             0AE1  1601                     ENDIF
             0AE1        2008$:                                                     ;GENERATE LCL 2008 NAME
             0AE1  1602
             0AE1  1603                     CLEAR   TABLE_MODE                      ;SET TO NO TABLE MODE
       AF    0AE1               .BYTE       ^0250 ! A               ;with A
       32    0AE2               .BYTE       ^062
    040B'    0AE3               .WORD       <TABLE_MODE-HEAD>
             0AE5  1604
             0AE5  1605                     CALL    INPUT_NUM_IF                    ;LOOK FOR FIRST TEST NUMBER
       CD    0AE5               .BYTE       ^0315
    0D9B'    0AE6               .WORD       <INPUT_NUM_IF-HEAD>
             0AE8  1606
             0AE8  1607                     MVI     B,<^X02>                        ;NO FIRST NUMBER - ERROR
    02 06    0AE8               .BYTE       <B*8> ! 6 , ^X02&255
             0AEA  1608                     LDA     ERROR                           ;GET ERROR FLAG
       3A    0AEA               .BYTE       ^072
    02E2'    0AEB               .WORD       <ERROR-HEAD>
             0AED  1609                     ORA     A                               ;SET CONDITION CODES
       B7    0AED               .BYTE       ^0260 ! A
             0AEE  1610                     JNZ     ERROR_ROUTINE_NO_RET            ;REPORT IF ERROR.  DON'T RETURN
       C2    0AEE               .BYTE       ^0302
    0C45'    0AEF               .WORD       <ERROR_ROUTINE_NO_RET-HEAD>
             0AF1  1611
             0AF1  1612                     LDA     INPUT_NUM+3                     ;FIRST NUMBER IS FIRST TEST
       3A    0AF1               .BYTE       ^072
    0679'    0AF2               .WORD       <INPUT_NUM+3-HEAD>
             0AF4  1613                     STA     TEST_NUM1                       ;SAVE IT
```

```
      32  0AF4               .BYTE    ^062
   0427'  0AF5               .WORD    <TEST_NUM1-HEAD>
          0AF7  1614
          0AF7  1615                  CALL     INPUT_NUM_IF                 ;GET SECOND NUMBER IF THERE
      CD  0AF7               .BYTE    ^0315
   0D9B'  0AF8               .WORD    <INPUT_NUM_IF-HEAD>
          0AFA  1616
          0AFA  1617                  IF       ERROR
      3A  0AFA               .BYTE    ^072
   02E2'  0AFB               .WORD    <ERROR-HEAD>
      0F  0AFD               .BYTE    ^017
      D2  0AFE               .BYTE    ^0322
   0B07'  0AFF               .WORD    <2010$-HEAD>
          0B01  1618                  LDA      TEST_NUM1                    ;NO SECOND NUM - USE FIRST TEST
      3A  0B01               .BYTE    ^072
   0427'  0B02               .WORD    <TEST_NUM1-HEAD>
          0B04  1619
          0B04  1620                  ELSE
      C3  0B04               .BYTE    ^0303
   0B0A'  0B05               .WORD    <2011$-HEAD>
          0B07        2010$:                                            ;GENERATE LOCAL SYMBOL NAME
          0B07  1621
          0B07  1622                  LDA      INPUT_NUM+3                  ;SAVE ENDING TEST NUMBER
      3A  0B07               .BYTE    ^072
   0679'  0B08               .WORD    <INPUT_NUM+3-HEAD>
          0B0A  1623                  ENDIF
          0B0A        2011$:                                            ;GENERATE LCL 2011 NAME
          0B0A  1624
          0B0A  1625                  STA      TEST_NUM2
      32  0B0A               .BYTE    ^062
   0428'  0B0B               .WORD    <TEST_NUM2-HEAD>
          0B0D  1626
          0B0D  1627                  RET
      C9  0B0D               .BYTE    ^0311
          0B0E  1628
          0B0E  1629
          0B0E  1630 ;*******************************************************************************
          0B0E  1631 ;
          0B0E  1632 ;    DIAG_CONTIN
          0B0E  1633 ;    THIS SUBROUTINE HANDLES THE DIAGNOSE CONTINUE KEYWORD
          0B0E  1634 ;    A CONTINUE WILL CAUSE THE TESTING TO GO TO THE END OF THE SECTION
          0B0E  1635 ;
          0B0E  1636 ;    NOTE: - - TO BE EFFECTIVE THIS KEYWORD MUST BE GIVEN AFTER THE TEST
          0B0E  1637 ;              KEYWORD AND THE TEST KEYWORD MUST HAVE ONLY 1 PARAMETER
          0B0E  1638 ;              IF THE TEST PARAMETER IS GIVEN AFTER THE CONTINUE KEYWORD
          0B0E  1639 ;              IT WILL BE CANCELED OUT.
          0B0E  1640 ;
          0B0E  1641 ;*******************************************************************************
          0B0E  1642
          0B0E  1643 DIAG_CONTIN:      MVI      A,HEX_50                     ;MOVE LAST POSSIBLE TEST
   50 3E  0B0E               .BYTE    <A*8> ! 6 , HEX_50&255
          0B10  1644                  STA      TEST_NUM2                    ;TO ENDING TEST NUMBER
      32  0B10               .BYTE    ^062
   0428'  0B11               .WORD    <TEST_NUM2-HEAD>
          0B13  1645
          0B13  1646                  RET
      C9  0B13               .BYTE    ^0311
```

```
               0B14  1647
               0B14  1648
               0B14  1649 ;**********************************************************************
               0B14  1650 ;
               0B14  1651 ;  DIAG_PASS
               0B14  1652 ;  THIS SUBROUTINE INPUTS THE DIAGNOSE PASS COUNT.
               0B14  1653 ;  IF NOT SPECIFIED THE PASS COUNT WILL DEFAULT TO ONE.
               0B14  1654 ;  IF THE PASS COUNT IS SPECIFED AS -1 THIS INDICATES A CONTINUOUS LOOP
               0B14  1655 ;
               0B14  1656 ;**********************************************************************
               0B14  1657
               0B14  1658 DIAG_PASS:      CALL    INPUT_NUM_IF                    ;GET THE PASS COUNT
         CD    0B14                .BYTE   ^0315
      0D9B'    0B15                .WORD   <INPUT_NUM_IF-HEAD>
               0B17  1659
               0B17  1660                 MVI     B,<^X03>                        ;PASS COUNT ERROR
      03 06    0B17                .BYTE   <B*8> ! 6 , ^X03&255
               0B19  1661                 LDA     ERROR                           ;GET ERROR FLAG
         3A    0B19                .BYTE   ^072
      02E2'    0B1A                .WORD   <ERROR-HEAD>
               0B1C  1662                 ORA     A                               ;SET CONDITION CODES
         B7    0B1C                .BYTE   ^0260 ! A
               0B1D  1663                 JNZ     ERROR_ROUTINE_NO_RET            ;REPORT IF ERROR.  DON'T RETURN
         C2    0B1D                .BYTE   ^0302
      0C45'    0B1E                .WORD   <ERROR_ROUTINE_NO_RET-HEAD>
               0B20  1664
               0B20  1665                 IF      MINUS
         3A    0B20                .BYTE   ^072
      038B'    0B21                .WORD   <MINUS-HEAD>
         0F    0B23                .BYTE   ^017
         D2    0B24                .BYTE   ^0322
      0B32'    0B25                .WORD   <2012$-HEAD>
               0B27  1666
               0B27  1667                 MVI     A,HEX_FF
      FF 3E    0B27                .BYTE   <A*8> ! 6 , HEX_FF&255
               0B29  1668                 STA     PASS_CNT                        ;SET TO INFINITE PASSES
         32    0B29                .BYTE   ^062
      03EA'    0B2A                .WORD   <PASS_CNT-HEAD>
               0B2C  1669                 STA     PASS_CNT+1
         32    0B2C                .BYTE   ^062
      03EB'    0B2D                .WORD   <PASS_CNT+1-HEAD>
               0B2F  1670
               0B2F  1671                 ELSE
         C3    0B2F                .BYTE   ^0303
      0B38'    0B30                .WORD   <2013$-HEAD>
               0B32        2012$:                                         ;GENERATE LOCAL SYMBOL NAME
               0B32  1672
               0B32  1673                 LHLD    INPUT_NUM+2
         2A    0B32                .BYTE   ^052
      0678'    0B33                .WORD   <INPUT_NUM+2-HEAD>
               0B35  1674                 SHLD    PASS_CNT                        ;MOVE 2 BYTES PASS COUNT
         22    0B35                .BYTE   ^042
      03EA'    0B36                .WORD   <PASS_CNT-HEAD>
               0B38  1675
               0B38  1676                 ENDIF
               0B38        2013$:                                         ;GENERATE LCL 2013 NAME
               0B38  1677
```

```
          0B38  1678                       RET
      C9  0B38              .BYTE          ^0311
          0B39  1679
          0B39  1680
          0B39  1681 ;*********************************************************************
          0B39  1682 ;
          0B39  1683 ;   LOADER
          0B39  1684 ;   THIS ROUTINE LOADS A IMAGE INTO WCS OR THE CONSOLE BUT DOES
          0B39  1685 ;   NOT START IT AND DOES NOT INITIALIZE IT
          0B39  1686 ;
          0B39  1687 ;*********************************************************************
          0B39  1688
          0B39  1689 LOADER:                  SET      NOINIT
      AF  0B39              .BYTE          ^0250 ! A                      ;with A
      3C  0B3A              .BYTE          ^04 ! <8*A>
      32  0B3B              .BYTE          ^062
   03BE'  0B3C              .WORD          <NOINIT-HEAD>
          0B3E  1690                       CALL     DIAG_SECTION
      CD  0B3E              .BYTE          ^0315
   0A5D'  0B3F              .WORD          <DIAG_SECTION-HEAD>
          0B41  1691                       CLEAR    NOINIT
      AF  0B41              .BYTE          ^0250 ! A                      ;with A
      32  0B42              .BYTE          ^062
   03BE'  0B43              .WORD          <NOINIT-HEAD>
          0B45  1692                       RET
      C9  0B45              .BYTE          ^0311
          0B46  1693
          0B46  1694
          0B46  1695 ;*********************************************************************
          0B46  1696 ;
          0B46  1697 ;   CONT_COMMAND
          0B46  1698 ;   THE CONTINUE COMMAND ALLOWS CONTINUATION OF TEST EXECUTION AFTER
          0B46  1699 ;   TESTING HAS BEEN HALTED
          0B46  1700 ;
          0B46  1701 ;*********************************************************************
          0B46  1702
          0B46  1703 CONT_COMMAND:        MVI      B,<^X04>              ;ERROR CODE IF CONTINUE CLEAR
   04 06  0B46              .BYTE          <B*8> ! 6 , ^X04&255
          0B48  1704
          0B48  1705                       LDA      CONTINUE              ;GET CONTINUE FLAG
      3A  0B48              .BYTE          ^072
   003A'  0B49              .WORD          <CONTINUE-HEAD>
          0B4B  1706                       ORA      A                     ;SET CONDITION CODES
      B7  0B4B              .BYTE          ^0260 ! A
          0B4C  1707                       JZ       ERROR_ROUTINE         ;NO CONTINUE AT THIS POINT IF
      CA  0B4C              .BYTE          ^0312
   0C4A'  0B4D              .WORD          <ERROR_ROUTINE-HEAD>
          0B4F  1708                                                      ; CONTINUE FLAG IS CLEAR
          0B4F  1709                                                      ; ELSE CONTINUE ON
          0B4F  1710                       IFN      CONSOLE_TEST          ;DO WR RESTORE IF 8085
      3A  0B4F              .BYTE          ^072
   0255'  0B50              .WORD          <CONSOLE_TEST-HEAD>
      0F  0B52              .BYTE          ^017
      DA  0B53              .BYTE          ^0332
   0B59'  0B54              .WORD          <2014$-HEAD>
          0B56  1711                       CALL     RESTORE_WR            ; TESTS ARE NOT EXECUTING
      CD  0B56              .BYTE          ^0315
```

```
       0C0A' 0B57              .WORD   <RESTORE_WR-HEAD>
             0B59  1712                ENDIF
             0B59       2014$:                                  ;GENERATE LCL 2014 NAME
             0B59  1713
             0B59  1714                OUT     SETLIT                  ;TURN RUN LITE BACK ON
       3D D3 0B59              .BYTE   ^0323 , SETLIT&255     ;register A
             0B5B  1715
             0B5B  1716                LDA     C_EXECUTE               ;RESTORE FLAGS
          3A 0B5B              .BYTE   ^072
       0250' 0B5C              .WORD   <C_EXECUTE-HEAD>
             0B5E  1717                STA     EXECUTE
          32 0B5E              .BYTE   ^062
       02EA' 0B5F              .WORD   <EXECUTE-HEAD>
             0B61  1718
             0B61  1719                LXI     H,CONT_SAVE_CSR         ;RESTORE CSR
          21 0B61              .BYTE   <H*8> ! 1
      00'BE' 0B62              .BYTE   <CONT_SAVE_CSR-HEAD>&255 , <<CONT_SAVE_CSR-HEAD>&^XFF00>/256
             0B64  1720                LXI     D,SAVED_CSR
          11 0B64              .BYTE   <D*8> ! 1
      00'BB' 0B65              .BYTE   <SAVED_CSR-HEAD>&255 , <<SAVED_CSR-HEAD>&^XFF00>/256
             0B67  1721                CALL    MOVER_3_R
          CD 0B67              .BYTE   ^0315
       0F5F' 0B68              .WORD   <MOVER_3_R-HEAD>
             0B6A  1722
             0B6A  1723                LHLD    CONT_SAVE_UPC           ;RESTORE UPC
          2A 0B6A              .BYTE   ^052
       00C8' 0B6B              .WORD   <CONT_SAVE_UPC-HEAD>
             0B6D  1724                SHLD    SAVED_UPC
          22 0B6D              .BYTE   ^042
       00C4' 0B6E              .WORD   <SAVED_UPC-HEAD>
             0B70  1725
             0B70  1726                LDA     C_RUNNING               ;GET OLD RUNNING FLAG
          3A 0B70              .BYTE   ^072
       0251' 0B71              .WORD   <C_RUNNING-HEAD>
             0B73  1727                ORA     A                       ;SET CONDITION CODES
          B7 0B73              .BYTE   ^0260 ! A
             0B74  1728                CNZ     RESTART_CPU             ;RESTART IF SET
          C4 0B74              .BYTE   ^0304
       110E' 0B75              .WORD   <RESTART_CPU-HEAD>
             0B77  1729
             0B77  1730                SET     CONT_DONE
          AF 0B77              .BYTE   ^0250 ! A              ;with A
          3C 0B78              .BYTE   ^04 ! <8*A>
          32 0B79              .BYTE   ^062
       0256' 0B7A              .WORD   <CONT_DONE-HEAD>
             0B7C  1731
             0B7C  1732                RET
          C9 0B7C              .BYTE   ^0311
             0B7D  1733
             0B7D  1734
             0B7D  1735 ;*****************************************************************************
             0B7D  1736 ;
             0B7D  1737 ;  EXEC_SUB
             0B7D  1738 ;
             0B7D  1739 ;  THIS ROUTINE EXECUTES A SUBROUTINE IN WCS WHICH PERFORMS A SPECIFIC
             0B7D  1740 ;  FUNCTION.
             0B7D  1741 ;
```

```
                0B7D  1742 ;  INPUT CONDITIONS
                0B7D  1743 ;        H+L  = ADDRESS OF WCS SUBROUTINE
                0B7D  1744 ;
                0B7D  1745 ;*************************************************************************
                0B7D  1746
                0B7D  1747 EXEC_SUB:          MVI     B,<^X11>                       ;ERROR CODE IF WCS NOT LOADED
         11 06  0B7D                  .BYTE   <B*8> ! 6 , ^X11&255
                0B7F  1748                    CALL    CHECK_WCS_LOADED               ;CHECK FOR WCS LOADED SET
            CD  0B7F                  .BYTE   ^0315
        0C2A'   0B80                  .WORD   <CHECK_WCS_LOADED-HEAD>
                0B82  1749                                                           ; RETURN IF OK
                0B82  1750
                0B82  1751                    MOV     A,H                            ;GET SUBROUTINE ADDR
            7C  0B82                  .BYTE   ^0100 ! <A*8> ! H
                0B83  1752                    MOV     H,L
            65  0B83                  .BYTE   ^0100 ! <H*8> ! L
                0B84  1753                    MOV     L,A
            6F  0B84                  .BYTE   ^0100 ! <L*8> ! A
                0B85  1754                    SHLD    STARTING_UPC
            22  0B85                  .BYTE   ^042
        0407'   0B86                  .WORD   <STARTING_UPC-HEAD>
                0B88  1755
                0B88  1756                    CALL    START_CPU                      ;START THE SUBROUTINE
            CD  0B88                  .BYTE   ^0315
        10FF'   0B89                  .WORD   <START_CPU-HEAD>
                0B8B  1757                    CALL    SUB_ATTENTION                  ;WAIT FOR EXIT
            CD  0B8B                  .BYTE   ^0315
        1806'   0B8C                  .WORD   <SUB_ATTENTION-HEAD>
                0B8E  1758
                0B8E  1759                    RET
            C9  0B8E                  .BYTE   ^0311
                0B8F  1760
                0B8F  1761 ;*************************************************************************
                0B8F  1762 ;
                0B8F  1763 ;  CLEAR_DEFAULT
                0B8F  1764 ;  THIS ROUTINE SETS THE FLAGS TO THEIR DEFAULT VALUES
                0B8F  1765 ;
                0B8F  1766 ;*************************************************************************
                0B8F  1767
                0B8F  1768 CLEAR_DEFAULT:     MVI     B,BELL_C_DEF                   ;CLEAR BELL
         FB 06  0B8F                  .BYTE   <B*8> ! 6 , BELL_C_DEF&255
                0B91  1769                    CALL    CLEAR_LS_STAT
            CD  0B91                  .BYTE   ^0315
        12D8'   0B92                  .WORD   <CLEAR_LS_STAT-HEAD>
                0B94  1770
                0B94  1771                    MVI     B,NER_S_DEF                    ;SET NER
         02 06  0B94                  .BYTE   <B*8> ! 6 , NER_S_DEF&255
                0B96  1772                    CALL    SET_LS_STAT
            CD  0B96                  .BYTE   ^0315
        12CE'   0B97                  .WORD   <SET_LS_STAT-HEAD>
                0B99  1773
                0B99  1774                    MVI     B,LOOP_COM_C_DEF               ;BIT TO CLEAR LOOP COMMAND
         BF 06  0B99                  .BYTE   <B*8> ! 6 , LOOP_COM_C_DEF&255
                0B9B  1775                    CALL    CLEAR_LS_STAT
            CD  0B9B                  .BYTE   ^0315
        12D8'   0B9C                  .WORD   <CLEAR_LS_STAT-HEAD>
                0B9E  1776                    MVI     B,HALT_S_DEF                   ;SET HALT
```

```
   08 06  0B9E                 .BYTE   <B*8> ! 6 , HALT_S_DEF&255
          0BA0   1777                  CALL    SET_LS_STAT
      CD  0BA0                 .BYTE   ^0315
   12CE'  0BA1                 .WORD   <SET_LS_STAT-HEAD>
          0BA3   1778
          0BA3   1779                  CLEAR   ERROR_CON                      ;CLEAR LOOP
      AF  0BA3                 .BYTE   ^0250 ! A                 ;with A
      32  0BA4                 .BYTE   ^062
   0057'  0BA5                 .WORD   <ERROR_CON-HEAD>
          0BA7   1780                  MVI     B,LOOP_C_DEF
   BE 06  0BA7                 .BYTE   <B*8> ! 6 , LOOP_C_DEF&255
          0BA9   1781                  CALL    CLEAR_LS_STAT
      CD  0BA9                 .BYTE   ^0315
   12D8'  0BAA                 .WORD   <CLEAR_LS_STAT-HEAD>
          0BAC   1782
          0BAC   1783                  CLEAR   TRACE                          ;CLEAR TRACE
      AF  0BAC                 .BYTE   ^0250 ! A                 ;with A
      32  0BAD                 .BYTE   ^062
   044C'  0BAE                 .WORD   <TRACE-HEAD>
          0BB0   1784
          0BB0   1785                  MVI     B,SER_C_DEF                    ;CLEAR SER
   EF 06  0BB0                 .BYTE   <B*8> ! 6 , SER_C_DEF&255
          0BB2   1786                  CALL    CLEAR_LS_STAT
      CD  0BB2                 .BYTE   ^0315
   12D8'  0BB3                 .WORD   <CLEAR_LS_STAT-HEAD>
          0BB5   1787
          0BB5   1788                  MVI     B,SPECIAL_C_DEF                ;CLEAR SP
   7F 06  0BB5                 .BYTE   <B*8> ! 6 , SPECIAL_C_DEF&255
          0BB7   1789                  CALL    CLEAR_LS_STAT
      CD  0BB7                 .BYTE   ^0315
   12D8'  0BB8                 .WORD   <CLEAR_LS_STAT-HEAD>
          0BBA   1790
          0BBA   1791                  RET
      C9  0BBA                 .BYTE   ^0311
          0BBB   1792
          0BBB   1793 ;*******************************************************************************
          0BBB   1794 ;
          0BBB   1795 ;  INT_CLEAR_PAR
          0BBB   1796 ;  THIS SUBROUTINE IS CALLED FROM BOTH THE COMMAND CLEAR_PARITY AND FROM
          0BBB   1797 ;  THE INTERNAL CLEAR PARITY REQUEST
          0BBB   1798 ;
          0BBB   1799 ;  INPUT_CONDITION:
          0BBB   1800 ;        ERROR IS SET IF NO ADDRESS IS FOUND
          0BBB   1801 ;
          0BBB   1802 ;*******************************************************************************
          0BBB   1803
          0BBB   1804 INT_CLEAR_PAR:  LDA     ERROR                          ;GET ERROR FLAG
      3A  0BBB                 .BYTE   ^072
   02E2'  0BBC                 .WORD   <ERROR-HEAD>
          0BBE   1805                  ORA     A                              ;SET CONDITION CODES
      B7  0BBE                 .BYTE   ^0260 ! A
          0BBF   1806                  CZ      CHANGE_WCS                     ;CHANGE PARITY TO GOOD IF
      CC  0BBF                 .BYTE   ^0314
   0C1D'  0BC0                 .WORD   <CHANGE_WCS-HEAD>
          0BC2   1807                                                         ; ADDRESS GIVEN
          0BC2   1808
          0BC2   1809                  SET     PAR_ON                         ;SET FOR HALT ON PAR ERR
      AF  0BC2               .BYTE   ^0250 ! A              ;with A
      3C  0BC3               .BYTE   ^04 ! <8*A>
      32  0BC4               .BYTE   ^062
   03D6'  0BC5               .WORD   <PAR_ON-HEAD>
          0BC7   1810
          0BC7   1811                RET
      C9  0BC7               .BYTE   ^0311
          0BC8   1812
          0BC8   1813
```

```
               0BC8  1815 ;***********************************************************************
               0BC8  1816 ;
               0BC8  1817 ;   MISC SUBROUTINES
               0BC8  1818 ;
               0BC8  1819 ;***********************************************************************
               0BC8  1820 ;***********************************************************************
               0BC8  1821 ;
               0BC8  1822 ;   PARITY_CALC
               0BC8  1823 ;   THIS ROUTINE CALCULATES PARITY FOR THE WCS WORDS
               0BC8  1824 ;   AND PLACES IT IN BIT 23 OF WCS_WORD IF THE PARITY SELECTOR IS SET
               0BC8  1825 ;   TO BAD PARITY AS USED IN STOP ON MICRO MATCH THE PARITY WILL BE
               0BC8  1826 ;   CHANGED TO BAD PARITY IN BIT 23 OF CSR_VALUE
               0BC8  1827 ;
               0BC8  1828 ;   INPUT CONDITIONS:
               0BC8  1829 ;         H+L             ADDRESS OF 24 BIT WORD TO CALC PARITY ON
               0BC8  1830 ;         PARITY_ON       PARITY CALCULATING ENABLE FLAG
               0BC8  1831 ;         WCS_BAD_PARITY  INDICATES THAT THIS WCS WORD IS TO HAVE BAD PARITY
               0BC8  1832 ;
               0BC8  1833 ;   OUTPUT CONDITION:
               0BC8  1834 ;         WCS_BAD_PARITY  IS CLEARED IF BAD PARITY AND WCS CALC WERE SET
               0BC8  1835 ;         PARITY_ON       SET FOR PARITY CALCULATION
               0BC8  1836 ;
               0BC8  1837 ;***********************************************************************
               0BC8  1838
               0BC8  1839 PARITY_CALC:    SHLD    CALC_ADD                        ;SAVE INPUT POINTER
          22   0BC8                 .BYTE   ^042
       0252'   0BC9                 .WORD   <CALC_ADD-HEAD>
               0BCB  1840
               0BCB  1841                 IF      PARITY_ON                       ;IF PARITY CALC ENABLED
          3A   0BCB                 .BYTE   ^072
       0064'   0BCC                 .WORD   <PARITY_ON-HEAD>
          0F   0BCE                 .BYTE   ^017
          D2   0BCF                 .BYTE   ^0322
       0C04'   0BD0                 .WORD   <2015$-HEAD>
               0BD2  1842
               0BD2  1843                 LHLD    CALC_ADD
          2A   0BD2                 .BYTE   ^052
       0252'   0BD3                 .WORD   <CALC_ADD-HEAD>
               0BD5  1844                 MOV     A,M                             ;GET FIRST BYTE
          7E   0BD5                 .BYTE   ^0100 ! <A*8> ! M
               0BD6  1845                 ANI     HEX_7F                          ;AND OUT CURRENT PARITY BIT
          E6   0BD6                 .BYTE   ^0346
          7F   0BD7                 .BYTE   HEX_7F
               0BD8  1846                 INX     H
          23   0BD8                 .BYTE   <H*8> ! 3
               0BD9  1847                 XRA     M                               ;XOR WITH SECOND AND THIRD
          AE   0BD9                 .BYTE   ^0250 ! M             ;with A
               0BDA  1848                 INX     H                               ;BYTES OF 24 BIT WORD
          23   0BDA                 .BYTE   <H*8> ! 3
               0BDB  1849                 XRA     M
          AE   0BDB                 .BYTE   ^0250 ! M             ;with A
               0BDC  1850
               0BDC  1851                 DCX     H                               ;MOVE POINTER BACK AND
          2B   0BDC                 .BYTE   <H*8> ! 11
               0BDD  1852                 DCX     H                               ;GET THE HIGH BYTE
          2B   0BDD                 .BYTE   <H*8> ! 11
               0BDE  1853                 MOV     A,M
```

```
         7E  0BDE                     .BYTE   ^0100 ! <A*8> ! M
             0BDF   1854
             0BDF   1855                      IFPO                                        ;IF PARITY ODD
         EA  0BDF                     .BYTE   ^0352
      0BE7'  0BE0                     .WORD   <2016$-HEAD>
             0BE2   1856
             0BE2   1857                      ANI     HEX_7F                              ;AND OUT PARITY BIT
         E6  0BE2                     .BYTE   ^0346
         7F  0BE3                     .BYTE   HEX_7F
             0BE4   1858
             0BE4   1859                      ELSE
         C3  0BE4                     .BYTE   ^0303
      0BE9'  0BE5                     .WORD   <2017$-HEAD>
             0BE7          2016$:                                                         ;GENERATE LOCAL SYMBOL NAME
             0BE7   1860
             0BE7   1861                      ORI     HEX_80                              ;OR IN PARITY BIT
         F6  0BE7                     .BYTE   ^0366
         80  0BE8                     .BYTE   HEX_80
             0BE9   1862
             0BE9   1863                      ENDIF
             0BE9          2017$:                                                         ;GENERATE LCL 2017 NAME
             0BE9   1864
             0BE9   1865                      MOV     M,A                                 ;PUT DATA BACK IN CSR_VALUE
         77  0BE9                     .BYTE   ^0100 ! <M*8> ! A
             0BEA   1866                                                                  ; OR WCS_VALUE
             0BEA   1867                      IF      WCS_CALC                            ;THIS ROUTINE WHEN WCS PARITY
         3A  0BEA                     .BYTE   ^072
      058A'  0BEB                     .WORD   <WCS_CALC-HEAD>
         0F  0BED                     .BYTE   ^017
         D2  0BEE                     .BYTE   ^0322
      0C04'  0BEF                     .WORD   <2018$-HEAD>
             0BF1   1868                                                                  ; IS CALCULATED
             0BF1   1869                      IF      WCS_BAD_PARITY
         3A  0BF1                     .BYTE   ^072
      006E'  0BF2                     .WORD   <WCS_BAD_PARITY-HEAD>
         0F  0BF4                     .BYTE   ^017
         D2  0BF5                     .BYTE   ^0322
      0C04'  0BF6                     .WORD   <2019$-HEAD>
             0BF8   1870                      LHLD    CALC_ADD
         2A  0BF8                     .BYTE   ^052
      0252'  0BF9                     .WORD   <CALC_ADD-HEAD>
             0BFB   1871                      MOV     A,M
         7E  0BFB                     .BYTE   ^0100 ! <A*8> ! M
             0BFC   1872                      RAL
         17  0BFC                     .BYTE   ^027
             0BFD   1873                      CMC                                         ;FLIP PARITY BIT IN CARRY
         3F  0BFD                     .BYTE   ^077
             0BFE   1874                      RAR                                         ;TO MAKE BAD PARITY
         1F  0BFE                     .BYTE   ^037
             0BFF   1875                      MOV     M,A
         77  0BFF                     .BYTE   ^0100 ! <M*8> ! A
             0C00   1876                      CLEAR   WCS_BAD_PARITY                      ;CLEAR BAD PARITY FLAG
         AF  0C00                     .BYTE   ^0250 ! A                  ;with A
         32  0C01                     .BYTE   ^062
      006E'  0C02                     .WORD   <WCS_BAD_PARITY-HEAD>
             0C04   1877                      ENDIF
             0C04          2019$:                                                         ;GENERATE LCL 2019 NAME
```

```
              0C04   1878                     ENDIF
              0C04          2018$:                                                    ;GENERATE LCL 2018 NAME
              0C04   1879
              0C04   1880                     ENDIF
              0C04          2015$:                          .                         ;GENERATE LCL 2015 NAME
              0C04   1881
              0C04   1882                     SET     PARITY_ON                       ;TURN PARITY CALC BACK ON
        AF    0C04                  .BYTE     ^0250 ! A                 ;with A
        3C    0C05                  .BYTE     ^04 ! <8*A>
        32    0C06                  .BYTE     ^062
     0064'    0C07                  .WORD     <PARITY_ON-HEAD>
              0C09   1883
              0C09   1884                     RET
        C9    0C09                  .BYTE     ^0311
              0C0A   1885
              0C0A   1886
              0C0A   1887 ;*******************************************************************************
              0C0A   1888 ;
              0C0A   1889 ;  RESTORE_WR
              0C0A   1890 ;  THIS ROUTINE CALLS A WCS SUBROUTINE THAT RESTORES THE WORKING REGS
              0C0A   1891 ;  OF THE 2901 FROM A SAVED AREA
              0C0A   1892 ;
              0C0A   1893 ;*******************************************************************************
              0C0A   1894
              0C0A   1895 RESTORE_WR:          LXI     H,WCS_REST_WR                   ;ADDRESS OF SUBROUTINE
        21    0C0A                  .BYTE     <H*8> ! 1
     00 57    0C0B                  .BYTE     <WCS_REST_WR-HEAD>&255 , <<WCS_REST_WR-HEAD>&^XFF00>/256
              0C0D   1896                     CALL    EXEC_SUB                        ;DO THE SUBROUTINE
        CD    0C0D                  .BYTE     ^0315
     0B7D'    0C0E                  .WORD     <EXEC_SUB-HEAD>
              0C10   1897
              0C10   1898                     RET
        C9    0C10                  .BYTE     ^0311
              0C11   1899
              0C11   1900
              0C11   1901 ;*******************************************************************************
              0C11   1902 ;
              0C11   1903 ;  SAVE_WR
              0C11   1904 ;  THIS ROUTINE CALLS A WCS SUBROUTINE THAT SAVES THE CONTENTS OF THE
              0C11   1905 ;  2901 IN A SPECIAL SAVE AREA SO THEY MAY BE RESTORED LATER.
              0C11   1906 ;
              0C11   1907 ;*******************************************************************************
              0C11   1908
              0C11   1909 SAVE_WR:             SET     NO_SAVE_UPC_CSR                 ;SET FLAG SO SAVED CSR AND
        AF    0C11                  .BYTE     ^0250 ! A                 ;with A
        3C    0C12                  .BYTE     ^04 ! <8*A>
        32    0C13                  .BYTE     ^062
     03C0'    0C14                  .WORD     <NO_SAVE_UPC_CSR-HEAD>
              0C16   1910                                                             ; UPC ARE NOT DESTROYED
              0C16   1911                     LXI     H,WCS_SAVE_WR                   ;ADDRESS OF SUBROUTINE
        21    0C16                  .BYTE     <H*8> ! 1
     00 56    0C17                  .BYTE     <WCS_SAVE_WR-HEAD>&255 , <<WCS_SAVE_WR-HEAD>&^XFF00>/256
              0C19   1912                     CALL    EXEC_SUB                        ;DO THE SUBROUTINE
        CD    0C19                  .BYTE     ^0315
     0B7D'    0C1A                  .WORD     <EXEC_SUB-HEAD>
              0C1C   1913
              0C1C   1914                     RET
     C9  0C1C                  .BYTE   ^0311
         0C1D  1915
         0C1D  1916
         0C1D  1917 ;*******************************************************************************
         0C1D  1918 ;
         0C1D  1919 ;   CHANGE_WCS
         0C1D  1920 ;   THIS ROUTINE READS A WCS WORD, THEN CALCULATES PARITY ON IT AND
         0C1D  1921 ;   WRITES IT BACK.  THIS IS USED FOR SETTING AND CLEARING SOMM
         0C1D  1922 ;   ADDRESSES AND SETING BAD PARITY
         0C1D  1923 ;
         0C1D  1924 ;   INPUT CONDITIONS:
         0C1D  1925 ;         WCS_BAD_PARITY MUST BE SET OR CLEARED
         0C1D  1926 ;         BECAUSE IT IS USED IN A CALLED ROUTINE
         0C1D  1927 ;
         0C1D  1928 ;         INPUT_NUM MUST HAVE THE ADDRESS TO BE CHANGED
         0C1D  1929 ;
         0C1D  1930 ;*******************************************************************************
         0C1D  1931
         0C1D  1932 CHANGE_WCS:     LHLD    INPUT_NUM+2
     2A  0C1D                  .BYTE   ^052
  0678'  0C1E                  .WORD   <INPUT_NUM+2-HEAD>
         0C20  1933                     SHLD    WCS_ADDRESS                     ;PUT ADDRESS IN UPC TO READ
     22  0C20                  .BYTE   ^042
  006C'  0C21                  .WORD   <WCS_ADDRESS-HEAD>
         0C23  1934                     CALL    READ_WCS_R                      ;FROM WCS
     CD  0C23                  .BYTE   ^0315
  0E6D'  0C24                  .WORD   <READ_WCS_R-HEAD>
         0C26  1935
         0C26  1936                     CALL    WRITE_WCS_R                     ;WRITE WORD BACK WITH
     CD  0C26                  .BYTE   ^0315
  0E8A'  0C27                  .WORD   <WRITE_WCS_R-HEAD>
         0C29  1937                                                             ;PARITY
         0C29  1938                     RET
     C9  0C29                  .BYTE   ^0311
         0C2A  1939
         0C2A  1940
         0C2A  1941 ;*********************************************************************************
         0C2A  1942 ;
         0C2A  1943 ;   CHECK_WCS LOADED
         0C2A  1944 ;
         0C2A  1945 ;   THIS ROUTINE CHECKS THE WCS LOADED FLAG AND REPORTS AN ERROR IF SET.  IT
         0C2A  1946 ;   WILL POP THE STACK IF ERROR IS SET, SO THAT THE RETURN IN THE ERROR ROUTINE
         0C2A  1947 ;   WILL SKIP THE REST OF THE ROUTINE THAT HAD THE ERROR.
         0C2A  1948 ;
         0C2A  1949 ;*********************************************************************************
         0C2A  1950
         0C2A  1951 CHECK_WCS_LOADED:
         0C2A  1952                     LDA     WCS_LOADED                      ;GET WCS LOADED FLAG
     3A  0C2A                  .BYTE   ^072
  058B'  0C2B                  .WORD   <WCS_LOADED-HEAD>
         0C2D  1953                     ORA     A                               ;SET CONDITION CODES
     B7  0C2D                  .BYTE   ^0260 ! A
         0C2E  1954                     RNZ                                     ;RETURN IF WCS LOADED
     C0  0C2E                  .BYTE   ^0300
         0C2F  1955
         0C2F  1956                     CLEAR   NOADD_FLG                       ;ELSE CLEAR FLAG IF SET
     AF  0C2F                  .BYTE   ^0250 ! A               ;with A
     32  0C30                     .BYTE   ^062
  03BD'  0C31                     .WORD   <NOADD_FLG-HEAD>
         0C33  1957                       POP     $PSW                            ;POP THE STACK TO REMOVE
     F1  0C33                     .BYTE   ^0301 ! <8*$PSW>
         0C34  1958                                                               ; RETURN ADDRESS TO CALLING
         0C34  1959                                                               ; ROUTINE
         0C34  1960                       JMP     ERROR_ROUTINE                   ;GO REPORT ERROR BELOW
     C3  0C34                     .BYTE   ^0303
  0C4A'  0C35                     .WORD   <ERROR_ROUTINE-HEAD>
         0C37  1961
         0C37  1962 ;*****************************************************************************
         0C37  1963 ;
         0C37  1964 ;   CHECK_ERR_FLG:
         0C37  1965 ;
         0C37  1966 ;   THIS ROUTINE CHECKS THE ERROR FLAG AND REPORTS AN ERROR IF SET.  IT WILL
         0C37  1967 ;   POP THE STACK IF ERROR IS SET, SO THAT THE RETURN IN THE ERROR ROUTINE
         0C37  1968 ;   WILL SKIP THE REST OF THE ROUTINE THAT HAD THE ERROR.
         0C37  1969 ;
         0C37  1970 ;*****************************************************************************
         0C37  1971
         0C37  1972 INPUT_NUM_CHECK:CALL    INPUT_NUM_IF                    ;GET INPUT DATA
     CD  0C37                     .BYTE   ^0315
  0D9B'  0C38                     .WORD   <INPUT_NUM_IF-HEAD>
         0C3A  1973
         0C3A  1974 CHECK_ERR_10:   MVI     B,<^X10>                        ;ERROR CODE IF ERROR SET
  10 06  0C3A                     .BYTE   <B*8> ! 6 , ^X10&255
         0C3C  1975                                                               ; (NO INPUT ADDRESS OR DATA)
         0C3C  1976
         0C3C  1977 CHECK_ERR_FLG:  LDA     ERROR                           ;GET ERROR FLAG
     3A  0C3C                     .BYTE   ^072
  02E2'  0C3D                     .WORD   <ERROR-HEAD>
         0C3F  1978                 ORA     A                               ;SET CONDITION CODES
     B7  0C3F                     .BYTE   ^0260 ! A
         0C40  1979                 RZ                                      ;RETURN IF NO ERROR
     C8  0C40                     .BYTE   ^0310
         0C41  1980
         0C41  1981                 POP     $PSW                            ;POP THE STACK TO REMOVE
     F1  0C41                     .BYTE   ^0301 ! <8*$PSW>
         0C42  1982                                                         ; RETURN ADDRESS TO CALLING
         0C42  1983                                                         ; ROUTINE
         0C42  1984                 JMP     ERROR_ROUTINE                   ;GO REPORT ERROR BELOW
     C3  0C42                     .BYTE   ^0303
  0C4A'  0C43                     .WORD   <ERROR_ROUTINE-HEAD>
         0C45  1985
         0C45  1986 ;*****************************************************************************
         0C45  1987 ;
         0C45  1988 ;   ERROR_ROUTINE
         0C45  1989 ;   THIS ROUTINE WILL REPORT AN ERROR AND ITS ERROR NUMBER
         0C45  1990 ;
         0C45  1991 ;   INPUT CONDITIONS:
         0C45  1992 ;         B = ERROR CODE
         0C45  1993 ;
         0C45  1994 ;*****************************************************************************
         0C45  1995
         0C45  1996 ERROR_ROUTINE_NO_RET:
         0C45  1997                 SET     NO_RETURN                       ;SET FLAG, JUMP PARSER AFTER
     AF  0C45                     .BYTE   ^0250 ! A               ;with A
```

```
         3C  0C46                    .BYTE   ^04 ! <8*A>
         32  0C47                    .BYTE   ^062
     03BF'   0C48                    .WORD   <NO_RETURN-HEAD>
             0C4A  1998                                                      ; ERROR REPORTED
             0C4A  1999 ERROR_ROUTINE:  MOV     A,B                          ;ERROR CODE FROM B TO AC
         78  0C4A                    .BYTE   ^0100 ! <A*8> ! B
             0C4B  2000                      STA     HEX_BUF                 ;SAVE ERROR CODE
         32  0C4B                    .BYTE   ^062
     005B'   0C4C                    .WORD   <HEX_BUF-HEAD>
             0C4E  2001                      STA     APT_ERROR_NUMBER+1      ;SAVE IN APT MAILBOX
         32  0C4E                    .BYTE   ^062
     0013'   0C4F                    .WORD   <APT_ERROR_NUMBER+1-HEAD>
             0C51  2002
             0C51  2003                      MVI     B,<^X25>                ;CHECK FOR TU58 ERROR
      25 06  0C51                    .BYTE   <B*8> ! 6 , ^X25&255
             0C53  2004                      XRA     B
         A8  0C53                    .BYTE   ^0250 ! B              ;with A
             0C54  2005                      IFZ                             ;REPORT BAD TU58 IF ?25 ERROR
         C2  0C54                    .BYTE   ^0302
     0C75'   0C55                    .WORD   <2020$-HEAD>
             0C57  2006                      CALL    CRLF_R
         CD  0C57                    .BYTE   ^0315
     101A'   0C58                    .WORD   <CRLF_R-HEAD>
             0C5A  2007                      LXI     H,BAD_TAPE_A
         21  0C5A                    .BYTE   <H*8> ! 1
    01'99'   0C5B                    .BYTE   <BAD_TAPE_A-HEAD>&255 , <<BAD_TAPE_A-HEAD>&^XFF00>/256
             0C5D  2008                      CALL    PRINT_STRING_R
         CD  0C5D                    .BYTE   ^0315
     100E'   0C5E                    .WORD   <PRINT_STRING_R-HEAD>
             0C60  2009                      CALL    CRLF_R
         CD  0C60                    .BYTE   ^0315
     101A'   0C61                    .WORD   <CRLF_R-HEAD>
             0C63  2010                      LXI     H,ABORT_A
         21  0C63                    .BYTE   <H*8> ! 1
    01'64'   0C64                    .BYTE   <ABORT_A-HEAD>&255 , <<ABORT_A-HEAD>&^XFF00>/256
             0C66  2011                      CALL    PRINT_STRING_R
         CD  0C66                    .BYTE   ^0315
     100E'   0C67                    .WORD   <PRINT_STRING_R-HEAD>
             0C69  2012                      CALL    CRLF_R
         CD  0C69                    .BYTE   ^0315
     101A'   0C6A                    .WORD   <CRLF_R-HEAD>
             0C6C  2013                      LXI     H,END_A
         21  0C6C                    .BYTE   <H*8> ! 1
    02'62'   0C6D                    .BYTE   <END_A-HEAD>&255 , <<END_A-HEAD>&^XFF00>/256
             0C6F  2014                      CALL    PRINT_STRING_R
         CD  0C6F                    .BYTE   ^0315
     100E'   0C70                    .WORD   <PRINT_STRING_R-HEAD>
             0C72  2015                      JMP     STNDRD_CON_COM          ;CANNOT CONTINUE CRD
         C3  0C72                    .BYTE   ^0303
     098A'   0C73                    .WORD   <STNDRD_CON_COM-HEAD>
             0C75  2016                      ENDIF
             0C75  2017         2020$:                                       ;GENERATE LCL 2020 NAME
             0C75  2018                      MVI     A,1                     ;1 IN ACCUM
      01 3E  0C75                    .BYTE   <A*8> ! 6 , 1&255
             0C77  2019                      STA     APT_ERROR_NUMBER        ;1 IN HIGH BYTE TO INDICATE
         32  0C77                    .BYTE   ^062
```

```
  0012'  0C78              .WORD    <APT_ERROR_NUMBER-HEAD>
         0C7A   2020                                                         ; MONITOR ERROR
         0C7A   2021
         0C7A   2022                CLEAR    ERROR                           ;RESET ERROR CONDITON
     AF  0C7A              .BYTE    ^0250 ! A                   ;with A
     32  0C7B              .BYTE    ^062
  02E2'  0C7C              .WORD    <ERROR-HEAD>
         0C7E   2023                CLEAR    NOADD_FLG                       ;MAKE SURE EXAM FLAG IS CLEAR
     AF  0C7E              .BYTE    ^0250 ! A                   ;with A
     32  0C7F              .BYTE    ^062
  03BD'  0C80              .WORD    <NOADD_FLG-HEAD>
         0C82   2024                CLEAR    CTLDIS                          ;ENABLE CONTROL CHAR CHECK
     AF  0C82              .BYTE    ^0250 ! A                   ;with A
     32  0C83              .BYTE    ^062
   40FE  0C84              .WORD    <CTLDIS-HEAD>
         0C86   2025                                                         ; IF DISABLED
         0C86   2026                MVI      A,2                             ;INDICATE ERROR
  02 3E  0C86              .BYTE    <A*8> ! 6 , 2&255
         0C88   2027                STA      APT_MESSAGE_CODE+1              ;STORE IN MAILBOX
     32  0C88              .BYTE    ^062
  0011'  0C89              .WORD    <APT_MESSAGE_CODE+1-HEAD>
         0C8B   2028
         0C8B   2029                LXI      H,FAIL_A                        ;PRINT *FAIL* MESSAGE
     21  0C8B              .BYTE    <H*8> ! 1
02'EF'   0C8C              .BYTE    <FAIL_A-HEAD>&255 , <<FAIL_A-HEAD>&^XFF00>/256
         0C8E   2030                CALL     PRINT_STRING_R
     CD  0C8E              .BYTE    ^0315
  100E'  0C8F              .WORD    <PRINT_STRING_R-HEAD>
         0C91   2031                CALL     CRLF_R                          ;PRINT CRLF
     CD  0C91              .BYTE    ^0315
  101A'  0C92              .WORD    <CRLF_R-HEAD>
         0C94   2032                LXI      H,ABORT_A                       ;PRINT AUTOTEST ABORT MESSAGE
     21  0C94              .BYTE    <H*8> ! 1
01'64'   0C95              .BYTE    <ABORT_A-HEAD>&255 , <<ABORT_A-HEAD>&^XFF00>/256
         0C97   2033                CALL     PRINT_STRING_R
     CD  0C97              .BYTE    ^0315
  100E'  0C98              .WORD    <PRINT_STRING_R-HEAD>
         0C9A   2034
         0C9A   2035                LXI      H,CPU_A                         ;CPU IS POSSIBLY BAD
     21  0C9A              .BYTE    <H*8> ! 1
02'57'   0C9B              .BYTE    <CPU_A-HEAD>&255 , <<CPU_A-HEAD>&^XFF00>/256
         0C9D   2036                CALL     PRINT_STRING_R                  ;PRINT
     CD  0C9D              .BYTE    ^0315
  100E'  0C9E              .WORD    <PRINT_STRING_R-HEAD>
         0CA0   2037
         0CA0   2038                MVI      C,5                             ;BYTE COUNT
  05 0E  0CA0              .BYTE    <C*8> ! 6 , 5&255
         0CA2   2039                LXI      H,SECTION_NAME                  ;LOAD SECTION NAME INTO DE
     21  0CA2              .BYTE    <H*8> ! 1
08'CA'   0CA3              .BYTE    <SECTION_NAME-HEAD>&255 , <<SECTION_NAME-HEAD>&^XFF00>/256
         0CA5   2040                XCHG
     EB  0CA5              .BYTE    ^0353
         0CA6   2041
         0CA6   2042                LXI      H,ENKCC_A                       ;SEE IF ENKCC IS BEING RUN
     21  0CA6              .BYTE    <H*8> ! 1
02'C9'   0CA7              .BYTE    <ENKCC_A-HEAD>&255 , <<ENKCC_A-HEAD>&^XFF00>/256
         0CA9   2043                CALL     COMPARE_R
```

```
      CD  0CA9                  .BYTE   ^0315
   0F55'  0CAA                  .WORD   <COMPARE_R-HEAD>
          0CAC  2044                    IFZ                                     ;IF IT IS
      C2  0CAC                  .BYTE   ^0302
   0CBB'  0CAD                  .WORD   <2021$-HEAD>
          0CAF  2045                    LXI     H,OR_A                          ;THEN PRINT MEMORY BAD
      21  0CAF                  .BYTE   <H*8> ! 1
  03'D0'  0CB0                  .BYTE   <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
          0CB2  2046                    CALL    PRINT_STRING_R
      CD  0CB2                  .BYTE   ^0315
   100E'  0CB3                  .WORD   <PRINT_STRING_R-HEAD>
          0CB5  2047                    LXI     H,MEMORY_A
      21  0CB5                  .BYTE   <H*8> ! 1
  03'4D'  0CB6                  .BYTE   <MEMORY_A-HEAD>&255 , <<MEMORY_A-HEAD>&^XFF00>/256
          0CB8  2048                    CALL    PRINT_STRING_R
      CD  0CB8                  .BYTE   ^0315
   100E'  0CB9                  .WORD   <PRINT_STRING_R-HEAD>
          0CBB  2049                    ENDIF
          0CBB         2021$:                                                   ;GENERATE LCL 2021 NAME
          0CBB  2050
          0CBB  2051                    LXI     H,ENKCE_A                       ;SEE IF ENKCE IS BEING RUN
      21  0CBB                  .BYTE   <H*8> ! 1
  02'CE'  0CBC                  .BYTE   <ENKCE_A-HEAD>&255 , <<ENKCE_A-HEAD>&^XFF00>/256
          0CBE  2052                    CALL    COMPARE_R
      CD  0CBE                  .BYTE   ^0315
   0F55'  0CBF                  .WORD   <COMPARE_R-HEAD>
          0CC1  2053                    IFZ                                     ;IF IT IS
      C2  0CC1                  .BYTE   ^0302
   0CD0'  0CC2                  .WORD   <2022$-HEAD>
          0CC4  2054                    LXI     H,OR_A                          ;THEN PRINT FPA BAD
      21  0CC4                  .BYTE   <H*8> ! 1
  03'D0'  0CC5                  .BYTE   <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
          0CC7  2055                    CALL    PRINT_STRING_R
      CD  0CC7                  .BYTE   ^0315
   100E'  0CC8                  .WORD   <PRINT_STRING_R-HEAD>
          0CCA  2056                    LXI     H,FPA_A
      21  0CCA                  .BYTE   <H*8> ! 1
  02'FE'  0CCB                  .BYTE   <FPA_A-HEAD>&255 , <<FPA_A-HEAD>&^XFF00>/256
          0CCD  2057                    CALL    PRINT_STRING_R
      CD  0CCD                  .BYTE   ^0315
   100E'  0CCE                  .WORD   <PRINT_STRING_R-HEAD>
          0CD0  2058                    ENDIF
          0CD0         2022$:                                                   ;GENERATE LCL 2022 NAME
          0CD0  2059
          0CD0  2060                    LXI     H,ENKCH_A                       ;SEE IF ENKCH IS BEING RUN
      21  0CD0                  .BYTE   <H*8> ! 1
  02'D3'  0CD1                  .BYTE   <ENKCH_A-HEAD>&255 , <<ENKCH_A-HEAD>&^XFF00>/256
          0CD3  2061                    CALL    COMPARE_R
      CD  0CD3                  .BYTE   ^0315
   0F55'  0CD4                  .WORD   <COMPARE_R-HEAD>
          0CD6  2062                    IFZ                                     ;IF IT IS
      C2  0CD6                  .BYTE   ^0302
   0CE5'  0CD7                  .WORD   <2023$-HEAD>
          0CD9  2063                    LXI     H,OR_A                          ;THEN PRINT IDC BAD
      21  0CD9                  .BYTE   <H*8> ! 1
  03'D0'  0CDA                  .BYTE   <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
          0CDC  2064                    CALL    PRINT_STRING_R
      CD  0CDC                   .BYTE    ^0315
   100E'  0CDD                   .WORD    <PRINT_STRING_R-HEAD>
          0CDF   2065                     LXI     H,IDC_A
      21  0CDF                   .BYTE    <H*8> ! 1
  03'3E'  0CE0                   .BYTE    <IDC_A-HEAD>&255 , <<IDC_A-HEAD>&^XFF00>/256
          0CE2   2066                     CALL    PRINT_STRING_R
      CD  0CE2                   .BYTE    ^0315
   100E'  0CE3                   .WORD    <PRINT_STRING_R-HEAD>
          0CE5   2067                     ENDIF
          0CE5        2023$:                                          ;GENERATE LCL 2023 NAME
          0CE5   2068
          0CE5   2069                     LXI     H,ENKCF_A            ;SEE IF ENKCF IS BEING RUN
      21  0CE5                   .BYTE    <H*8> ! 1
  02'D8'  0CE6                   .BYTE    <ENKCF_A-HEAD>&255 , <<ENKCF_A-HEAD>&^XFF00>/256
          0CE8   2070                     CALL    COMPARE_R
      CD  0CE8                   .BYTE    ^0315
   0F55'  0CE9                   .WORD    <COMPARE_R-HEAD>
          0CEB   2071                     IFZ                          ;IF IT IS
      C2  0CEB                   .BYTE    ^0302
   0CFA'  0CEC                   .WORD    <2024$-HEAD>
          0CEE   2072                     LXI     H,OR_A               ;THEN PRINT IDC BAD
      21  0CEE                   .BYTE    <H*8> ! 1
  03'D0'  0CEF                   .BYTE    <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
          0CF1   2073                     CALL    PRINT_STRING_R
      CD  0CF1                   .BYTE    ^0315
   100E'  0CF2                   .WORD    <PRINT_STRING_R-HEAD>
          0CF4   2074                     LXI     H,IDC_A
      21  0CF4                   .BYTE    <H*8> ! 1
  03'3E'  0CF5                   .BYTE    <IDC_A-HEAD>&255 , <<IDC_A-HEAD>&^XFF00>/256
          0CF7   2075                     CALL    PRINT_STRING_R
      CD  0CF7                   .BYTE    ^0315
   100E'  0CF8                   .WORD    <PRINT_STRING_R-HEAD>
          0CFA   2076                     ENDIF
          0CFA        2024$:                                          ;GENERATE LCL 2024 NAME
          0CFA   2077
          0CFA   2078                     LXI     H,ENKCG_A            ;SEE IF ENKCF IS BEING RUN
      21  0CFA                   .BYTE    <H*8> ! 1
  02'DD'  0CFB                   .BYTE    <ENKCG_A-HEAD>&255 , <<ENKCG_A-HEAD>&^XFF00>/256
          0CFD   2079                     CALL    COMPARE_R
      CD  0CFD                   .BYTE    ^0315
   0F55'  0CFE                   .WORD    <COMPARE_R-HEAD>
          0D00   2080                     IFZ                          ;IF IT IS
      C2  0D00                   .BYTE    ^0302
   0D1B'  0D01                   .WORD    <2025$-HEAD>
          0D03   2081                     LXI     H,OR_A               ;THEN PRINT IDC BAD
      21  0D03                   .BYTE    <H*8> ! 1
  03'D0'  0D04                   .BYTE    <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
          0D06   2082                     CALL    PRINT_STRING_R
      CD  0D06                   .BYTE    ^0315
   100E'  0D07                   .WORD    <PRINT_STRING_R-HEAD>
          0D09   2083                     LXI     H,IDC_A
      21  0D09                   .BYTE    <H*8> ! 1
  03'3E'  0D0A                   .BYTE    <IDC_A-HEAD>&255 , <<IDC_A-HEAD>&^XFF00>/256
          0D0C   2084                     CALL    PRINT_STRING_R
      CD  0D0C                   .BYTE    ^0315
   100E'  0D0D                   .WORD    <PRINT_STRING_R-HEAD>
          0D0F   2085                     LXI     H,OR_A               ;PRINT RL02 BAD
      21  0D0F                .BYTE   <H*8> ! 1
 03'D0'  0D10                .BYTE   <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
         0D12  2086                  CALL    PRINT_STRING_R
      CD  0D12                .BYTE   ^0315
   100E'  0D13                .WORD   <PRINT_STRING_R-HEAD>
         0D15  2087                  LXI     H,RL02_A
      21  0D15                .BYTE   <H*8> ! 1
 03'FE'  0D16                .BYTE   <RL02_A-HEAD>&255 , <<RL02_A-HEAD>&^XFF00>/256
         0D18  2088                  CALL    PRINT_STRING_R
      CD  0D18                .BYTE   ^0315
   100E'  0D19                .WORD   <PRINT_STRING_R-HEAD>
         0D1B  2089                  ENDIF
         0D1B       2025$:                                           ;GENERATE LCL 2025 NAME
         0D1B  2090
         0D1B  2091                  LXI     H,BAD_A
      21  0D1B                .BYTE   <H*8> ! 1
 01'7E'  0D1C                .BYTE   <BAD_A-HEAD>&255 , <<BAD_A-HEAD>&^XFF00>/256
         0D1E  2092                  CALL    PRINT_STRING_R
      CD  0D1E                .BYTE   ^0315
   100E'  0D1F                .WORD   <PRINT_STRING_R-HEAD>
         0D21  2093
         0D21  2094 ERR_MENU:        CALL    CRLF_R
      CD  0D21                .BYTE   ^0315
   101A'  0D22                .WORD   <CRLF_R-HEAD>
         0D24  2095
         0D24  2096                  LXI     H,MENU_A                    ;PRINT OPTIONS
      21  0D24                .BYTE   <H*8> ! 1
 03'55'  0D25                .BYTE   <MENU_A-HEAD>&255 , <<MENU_A-HEAD>&^XFF00>/256
         0D27  2097                  CALL    PRINT_STRING_R
      CD  0D27                .BYTE   ^0315
   100E'  0D28                .WORD   <PRINT_STRING_R-HEAD>
         0D2A  2098
         0D2A  2099                  CALL    INPUT_LINE                  ;GET DESIRED OPTION
      CD  0D2A                .BYTE   ^0315
   102E'  0D2B                .WORD   <INPUT_LINE-HEAD>
         0D2D  2100
         0D2D  2101                  MVI     C,1
   01 0E  0D2D                .BYTE   <C*8> ! 6 , 1&255
         0D2F  2102                  LXI     H,TTBUF                     ;POINT TO USER RESPONSE
      21  0D2F                .BYTE   <H*8> ! 1
 08'D1'  0D30                .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
         0D32  2103                  XCHG
      EB  0D32                .BYTE   ^0353
         0D33  2104
         0D33  2105                  LXI     H,ASCII_1                   ;WAS A 1 TYPED?
      21  0D33                .BYTE   <H*8> ! 1
 01'7B'  0D34                .BYTE   <ASCII_1-HEAD>&255 , <<ASCII_1-HEAD>&^XFF00>/256
         0D36  2106                  CALL    COMPARE_R
      CD  0D36                .BYTE   ^0315
   0F55'  0D37                .WORD   <COMPARE_R-HEAD>
         0D39  2107
         0D39  2108                  IFZ                                 ;IF 1 WAS TYPED
      C2  0D39                .BYTE   ^0302
   0D4B'  0D3A                .WORD   <2026$-HEAD>
         0D3C  2109                  CALL    CRLF_R
      CD  0D3C                .BYTE   ^0315
   101A'  0D3D                .WORD   <CRLF_R-HEAD>
```

```
             0D3F  2110                    LXI     H,END_A
       21    0D3F              .BYTE       <H*8> ! 1
  02'62'     0D40              .BYTE       <END_A-HEAD>&255 , <<END_A-HEAD>&^XFF00>/256
             0D42  2111                    CALL    PRINT_STRING_R
       CD    0D42              .BYTE       ^O315
    100E'    0D43              .WORD       <PRINT_STRING_R-HEAD>
             0D45  2112                    CALL    CRLF_R
       CD    0D45              .BYTE       ^O315
    101A'    0D46              .WORD       <CRLF_R-HEAD>
             0D48  2113                    JMP     STNDRD_CON_COM              ;THEN GO BACK TO CONSOLE
       C3    0D48              .BYTE       ^O303
    098A'    0D49              .WORD       <STNDRD_CON_COM-HEAD>
             0D4B  2114                    ENDIF
             0D4B        2026$:                                                ;GENERATE LCL 2026 NAME
             0D4B  2115
             0D4B  2116                    LXI     H,ASCII_2
       21    0D4B              .BYTE       <H*8> ! 1
  01'7C'     0D4C              .BYTE       <ASCII_2-HEAD>&255 , <<ASCII_2-HEAD>&^XFF00>/256
             0D4E  2117                    CALL    COMPARE_R
       CD    0D4E              .BYTE       ^O315
    0F55'    0D4F              .WORD       <COMPARE_R-HEAD>
             0D51  2118
             0D51  2119                    IFZ                                 ;IF 2 WAS TYPED
       C2    0D51              .BYTE       ^O302
    0D57'    0D52              .WORD       <2027$-HEAD>
             0D54  2120                    JMP     START_UP                    ;THEN START AUTO MODE
       C3    0D54              .BYTE       ^O303
    1CD2'    0D55              .WORD       <START_UP-HEAD>
             0D57  2121                    ENDIF
             0D57        2027$:                                                ;GENERATE LCL 2027 NAME
             0D57  2122
             0D57  2123                    LXI     H,ASCII_3
       21    0D57              .BYTE       <H*8> ! 1
  01'7D'     0D58              .BYTE       <ASCII_3-HEAD>&255 , <<ASCII_3-HEAD>&^XFF00>/256
             0D5A  2124                    CALL    COMPARE_R
       CD    0D5A              .BYTE       ^O315
    0F55'    0D5B              .WORD       <COMPARE_R-HEAD>
             0D5D  2125
             0D5D  2126                    IFZ                                 ;IF 3 WAS TYPED
       C2    0D5D              .BYTE       ^O302
    0D76'    0D5E              .WORD       <2028$-HEAD>
             0D60  2127
             0D60  2128                    LXI     H,CRLF_A                    ;POINT TO CR
       21    0D60              .BYTE       <H*8> ! 1
  02'5B'     0D61              .BYTE       <CRLF_A-HEAD>&255 , <<CRLF_A-HEAD>&^XFF00>/256
             0D63  2129                    CALL    PRINT_STRING_APT            ;PRINT CRLF
       CD    0D63              .BYTE       ^O315
    1014'    0D64              .WORD       <PRINT_STRING_APT-HEAD>
             0D66  2130                    MVI     A,HEX_3F                    ;QUESTION MARK
    3F 3E    0D66              .BYTE       <A*8> ! 6 , HEX_3F&255
             0D68  2131                    CALL    TYPE_CHAR
       CD    0D68              .BYTE       ^O315
    1027'    0D69              .WORD       <TYPE_CHAR-HEAD>
             0D6B  2132
             0D6B  2133                    MVI     C,1                         ;PRINT 1 BYTE (2 DIGITS)
    01 0E    0D6B              .BYTE       <C*8> ! 6 , 1&255
             0D6D  2134                    CALL    PRINT_HEX_R                 ;PRINT ERROR CODE IN HEX BUF
```

```
      CD  0D6D                 .BYTE   ^0315
   0F96'  0D6E                 .WORD   <PRINT_HEX_R-HEAD>
          0D70  2135
          0D70  2136                   LXI     H,ERROR_A                       ;PRINT " ERROR"
      21  0D70                 .BYTE   <H*8> ! 1
 02'E3'   0D71                 .BYTE   <ERROR_A-HEAD>&255 , <<ERROR_A-HEAD>&^XFF00>/256
          0D73  2137                   CALL    PRINT_STRING_APT
      CD  0D73                 .BYTE   ^0315
   1014'  0D74                 .WORD   <PRINT_STRING_APT-HEAD>
          0D76  2138                   ENDIF
          0D76       2028$:                                                    ;GENERATE LCL 2028 NAME
          0D76  2139                   JMP     ERR_MENU
      C3  0D76                 .BYTE   ^0303
   0D21'  0D77                 .WORD   <ERR_MENU-HEAD>
          0D79  2140
          0D79  2141                   LDA     NO_RETURN                       ;SEE IF CAN'T RETURN
      3A  0D79                 .BYTE   ^072
   03BF'  0D7A                 .WORD   <NO_RETURN-HEAD>
          0D7C  2142                   ORA     A                               ;SET CONDITION CODES
      B7  0D7C                 .BYTE   ^0260 ! A
          0D7D  2143                   RZ                                      ;RETURN IF FLAG CLEAR
      C8  0D7D                 .BYTE   ^0310
          0D7E  2144
          0D7E  2145                   CLEAR   NO_RETURN                       ;ELSE CLEAR FLAG
      AF  0D7E                 .BYTE   ^0250 ! A                  ;with A
      32  0D7F                 .BYTE   ^062
   03BF'  0D80                 .WORD   <NO_RETURN-HEAD>
          0D82  2146                   CLEAR   CONTINUE                        ;NO CONTINUE ALLOWED
      AF  0D82                 .BYTE   ^0250 ! A                  ;with A
      32  0D83                 .BYTE   ^062
   003A'  0D84                 .WORD   <CONTINUE-HEAD>
          0D86  2147                   LXI     $SP,PRI_STACK                   ;RESET STACK POINTER
      31  0D86                 .BYTE   <$SP*8> ! 1
   40 80  0D87                 .BYTE   <PRI_STACK-HEAD>&255 , <<PRI_STACK-HEAD>&^XFF00>/256
          0D89  2148                   JMP     PARSER                          ;GO TO PARSER
      C3  0D89                 .BYTE   ^0303
   1DAE'  0D8A                 .WORD   <PARSER-HEAD>
          0D8C  2149
          0D8C  2150 ;*************************************************************************
          0D8C  2151 ;
          0D8C  2152 ;  PRINT_CSR_VALUE
          0D8C  2153 ;  THIS ROUTINE PRINTS THE VALUE IN THE FIELD CSR_VALUE
          0D8C  2154 ;
          0D8C  2155 ;*************************************************************************
          0D8C  2156
          0D8C  2157 PRINT_CSR_VAL:  LXI     H,CSR_VALUE
      21  0D8C                 .BYTE   <H*8> ! 1
 00'B8'   0D8D                 .BYTE   <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
          0D8F  2158                   LXI     D,HEX_BUF                       ;MOVE CSR_VALUE TO HEX NUMBER
      11  0D8F                 .BYTE   <D*8> ! 1
 00'5B'   0D90                 .BYTE   <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
          0D92  2159                   CALL    MOVER_3_R                       ;PRINT AREA
      CD  0D92                 .BYTE   ^0315
   0F5F'  0D93                 .WORD   <MOVER_3_R-HEAD>
          0D95  2160
          0D95  2161                   MVI     C,3
   03 0E  0D95                 .BYTE   <C*8> ! 6 , 3&255
```

```
              0D97  2162                    CALL    PRINT_HEX_R                 ;PRINT 3 BYTES OF CSR
        CD    0D97                .BYTE     ^0315
     0F96'    0D98                .WORD     <PRINT_HEX_R-HEAD>
              0D9A  2163
              0D9A  2164                    RET
        C9    0D9A                .BYTE     ^0311
              0D9B  2165
              0D9B  2166
              0D9B  2167 ;******************************************************************************
              0D9B  2168 ;
              0D9B  2169 ;   INPUT_NUM_IF
              0D9B  2170 ;   THIS ROUTINE TAKES A NUMBER FROM THE INPUT LINE
              0D9B  2171 ;
              0D9B  2172 ;   INPUT CONDITIONS
              0D9B  2173 ;         TTBUF_PNT = POINTER TO INPUT STRING
              0D9B  2174 ;
              0D9B  2175 ;   OUTPUT CONDITIONS
              0D9B  2176 ;         MINUS = 1 IF MINUS SIGN FOUND,0 IF NOT
              0D9B  2177 ;         ERROR IS SET IF AN ILLEGAL HEX CHAR IS FOUND
              0D9B  2178 ;
              0D9B  2179 ;******************************************************************************
              0D9B  2180
              0D9B  2181 INPUT_NUM_IF:     CLEAR   ERROR
        AF    0D9B                .BYTE     ^0250 ! A                   ;with A
        32    0D9C                .BYTE     ^062
     02E2'    0D9D                .WORD     <ERROR-HEAD>
              0D9F  2182
              0D9F  2183                    IFEQI   TEMP_BUF,HEX_2D             ;IF MINUS SIGN
        3A    0D9F                .BYTE     ^072
     040E'    0DA0                .WORD     <TEMP_BUF-HEAD>
        FE    0DA2                .BYTE     ^0376
        2D    0DA3                .BYTE     HEX_2D
        C2    0DA4                .BYTE     ^0302
     0DB5'    0DA5                .WORD     <2029$-HEAD>
              0DA7  2184
              0DA7  2185                    SET     MINUS                       ;MINUS = INFINITE LOOP
        AF    0DA7                .BYTE     ^0250 ! A                   ;with A
        3C    0DA8                .BYTE     ^04 ! <8*A>
        32    0DA9                .BYTE     ^062
     038B'    0DAA                .WORD     <MINUS-HEAD>
              0DAC  2186                    CALL    SKIP_TO_SPEC                ;SKIP - SIGN AND THEN
        CD    0DAC                .BYTE     ^0315
     0E33'    0DAD                .WORD     <SKIP_TO_SPEC-HEAD>
              0DAF  2187                    CALL    SKIP_TO_SPEC                ;SKIP THE NUMBER
        CD    0DAF                .BYTE     ^0315
     0E33'    0DB0                .WORD     <SKIP_TO_SPEC-HEAD>
              0DB2  2188
              0DB2  2189                    ELSE
        C3    0DB2                .BYTE     ^0303
     0DFC'    0DB3                .WORD     <2030$-HEAD>
              0DB5           2029$:                                         ;GENERATE LOCAL SYMBOL NAME
              0DB5  2190
              0DB5  2191                    CLEAR   MINUS                       ;NO MINUS SIGN FOUND
        AF    0DB5                .BYTE     ^0250 ! A                   ;with A
        32    0DB6                .BYTE     ^062
     038B'    0DB7                .WORD     <MINUS-HEAD>
              0DB9  2192
```

```
                0DB9   2193                LXI     H,NUM_SHIFT                    ;SET UP SHIFT POINTER
           21   0DB9               .BYTE   <H*8> ! 1
       06'75'   0DBA               .BYTE   <NUM_SHIFT-HEAD>&255 , <<NUM_SHIFT-HEAD>&^XFF00>/256
                0DBC   2194                SHLD    SHIFT_PNT                      ;TO NUMBER BUFFER
           22   0DBC               .BYTE   ^042
        0068'   0DBD               .WORD   <SHIFT_PNT-HEAD>
                0DBF   2195                CLEAR   MINUS
           AF   0DBF               .BYTE   ^0250 ! A              ;with A
           32   0DC0               .BYTE   ^062
        038B'   0DC1               .WORD   <MINUS-HEAD>
                0DC3   2196                ZERO    INPUT_NUM,4                    ;CLEAR INPUT NUMBER AREA
           21   0DC3               .BYTE   <H*8> ! 1
       06'76'   0DC4               .BYTE   <INPUT_NUM-HEAD>&255 , <<INPUT_NUM-HEAD>&^XFF00>/256
        04 0E   0DC6               .BYTE   <C*8> ! 6 , 4&255
           AF   0DC8               .BYTE   ^0250 ! A              ;with A
                0DC9        2031$:         MOV     M,A
           77   0DC9               .BYTE   ^0100 ! <M*8> ! A
           23   0DCA               .BYTE   <H*8> ! 3
           0D   0DCB               .BYTE   ^05 ! <8*C>
           C2   0DCC               .BYTE   ^0302
        0DC9'   0DCD               .WORD   <2031$-HEAD>
                0DCF   2197
                0DCF   2198                CALL    SKIP_TO_SPEC                   ;SPAN AND GET COUNT
           CD   0DCF               .BYTE   ^0315
        0E33'   0DD0               .WORD   <SKIP_TO_SPEC-HEAD>
                0DD2   2199
                0DD2   2200                LHLD    OLD_TTBUF
           2A   0DD2               .BYTE   ^052
        03CD'   0DD3               .WORD   <OLD_TTBUF-HEAD>
                0DD5   2201                SHLD    TEMP_WORD1
           22   0DD5               .BYTE   ^042
        041B'   0DD6               .WORD   <TEMP_WORD1-HEAD>
                0DD8   2202
                0DD8   2203 1$:            ORA     A                              ;CLEAR THE CARRY SO SHIFT IN
           B7   0DD8               .BYTE   ^0260 ! A
                                                                                  ;WILL BE ZERO'S
                0DD9   2204                                                       ;SHIFT NUMBER BUFF LEFT NIBBLE
                0DD9   2205                CALL    SHIFTER_R
           CD   0DD9               .BYTE   ^0315
        0EB8'   0DDA               .WORD   <SHIFTER_R-HEAD>
                0DDC   2206                CALL    SHIFTER_R
           CD   0DDC               .BYTE   ^0315
        0EB8'   0DDD               .WORD   <SHIFTER_R-HEAD>
                0DDF   2207                CALL    SHIFTER_R
           CD   0DDF               .BYTE   ^0315
        0EB8'   0DE0               .WORD   <SHIFTER_R-HEAD>
                0DE2   2208                CALL    SHIFTER_R
           CD   0DE2               .BYTE   ^0315
        0EB8'   0DE3               .WORD   <SHIFTER_R-HEAD>
                0DE5   2209
                0DE5   2210                LHLD    TEMP_WORD1
           2A   0DE5               .BYTE   ^052
        041B'   0DE6               .WORD   <TEMP_WORD1-HEAD>
                0DE8   2211                MOV     A,M                            ;GET A CHAR AND BUMP POINTER
           7E   0DE8               .BYTE   ^0100 ! <A*8> ! M
                0DE9   2212                INX     H
           23   0DE9               .BYTE   <H*8> ! 3
                0DEA   2213                SHLD    TEMP_WORD1
```

```
     22  0DEA                  .BYTE   ^042
  041B'  0DEB                  .WORD   <TEMP_WORD1-HEAD>
         0DED  2214
         0DED  2215                    CALL    ASCII_TO_BIN            ;CONVERT TO BINARY
     CD  0DED                  .BYTE   ^0315
  0E15'  0DEE                  .WORD   <ASCII_TO_BIN-HEAD>
         0DF0  2216
         0DF0  2217                    LXI     H,INPUT_NUM+3           ;OR BINARY VALUE AND NIBBLE
     21  0DF0                  .BYTE   <H*8> ! 1
 06'79'  0DF1                  .BYTE   <INPUT_NUM+3-HEAD>&255 , <<INPUT_NUM+3-HEAD>&^XFF00>/256
         0DF3  2218                    ORA     M
     B6  0DF3                  .BYTE   ^0260 ! M
         0DF4  2219                    MOV     M,A
     77  0DF4                  .BYTE   ^0100 ! <M*8> ! A
         0DF5  2220
         0DF5  2221                    LXI     H,SKIP_CNT
     21  0DF5                  .BYTE   <H*8> ! 1
 04'06'  0DF6                  .BYTE   <SKIP_CNT-HEAD>&255 , <<SKIP_CNT-HEAD>&^XFF00>/256
         0DF8  2222                    DCR     M                       ;DEC CHAR COUNT
     35  0DF8                  .BYTE   ^05 ! <8*M>
         0DF9  2223                    JNZ     1$                      ;END?
     C2  0DF9                  .BYTE   ^0302
  0DD8'  0DFA                  .WORD   <1$-HEAD>
         0DFC  2224
         0DFC  2225                    ENDIF
         0DFC        2030$:                                            ;GENERATE LCL 2030 NAME
         0DFC  2226
         0DFC  2227                    IF      ERROR
     3A  0DFC                  .BYTE   ^072
  02E2'  0DFD                  .WORD   <ERROR-HEAD>
     0F  0DFF                  .BYTE   ^017
     D2  0E00                  .BYTE   ^0322
  0E14'  0E01                  .WORD   <2032$-HEAD>
         0E03  2228
         0E03  2229                    LHLD    OLD_TTBUF               ;NO NUMBERS FOUND MOVE POINTER
     2A  0E03                  .BYTE   ^052
  03CD'  0E04                  .WORD   <OLD_TTBUF-HEAD>
         0E06  2230                    SHLD    TTBUF_PNT               ;BACK TO WHERE IT WAS ON ENTRY
     22  0E06                  .BYTE   ^042
  044D'  0E07                  .WORD   <TTBUF_PNT-HEAD>
         0E09  2231
         0E09  2232                    LXI     H,OLD_TEMP_BUF
     21  0E09                  .BYTE   <H*8> ! 1
 03'C3'  0E0A                  .BYTE   <OLD_TEMP_BUF-HEAD>&255 , <<OLD_TEMP_BUF-HEAD>&^XFF00>/256
         0E0C  2233                    LXI     D,TEMP_BUF
     11  0E0C                  .BYTE   <D*8> ! 1
 04'0E'  0E0D                  .BYTE   <TEMP_BUF-HEAD>&255 , <<TEMP_BUF-HEAD>&^XFF00>/256
         0E0F  2234                    MVI     C,10
  0A 0E  0E0F                  .BYTE   <C*8> ! 6 , 10&255
         0E11  2235                    CALL    MOVER_R
     CD  0E11                  .BYTE   ^0315
  0F75'  0E12                  .WORD   <MOVER_R-HEAD>
         0E14  2236
         0E14  2237                    ENDIF
         0E14        2032$:                                            ;GENERATE LCL 2032 NAME
         0E14  2238
         0E14  2239                    RET
```

```
      C9  0E14               .BYTE   ^0311
          0E15  2240
          0E15  2241
          0E15  2242 ;*************************************************************************
          0E15  2243 ;
          0E15  2244 ;    ASCII_TO_BIN
          0E15  2245 ;    THIS ROUTINE CONVERTS AN ASCII CHAR TO A BINARY NUMBER
          0E15  2246 ;    IF THE CHAR IS OUT OF RANGE ERROR IS SET
          0E15  2247 ;
          0E15  2248 ;*************************************************************************
          0E15  2249
          0E15  2250 ASCII_TO_BIN:   CPI     <^X30>
      FE  0E15               .BYTE   ^0376
      30  0E16               .BYTE   ^X30
          0E17  2251                 JP      1$
      F2  0E17               .BYTE   ^0362
   0E1F'  0E18               .WORD   <1$-HEAD>
          0E1A  2252                 SET     ERROR                          ;CHAR BELOW RANGE
      AF  0E1A               .BYTE   ^0250 ! A                    ;with A
      3C  0E1B               .BYTE   ^04 ! <8*A>
      32  0E1C               .BYTE   ^062
   02E2'  0E1D               .WORD   <ERROR-HEAD>
          0E1F  2253 1$:             SUI     <^X30>
      D6  0E1F               .BYTE   ^0326
      30  0E20               .BYTE   ^X30
          0E21  2254                 CPI     <^XA>
      FE  0E21               .BYTE   ^0376
      0A  0E22               .BYTE   ^XA
          0E23  2255                 JM      3$
      FA  0E23               .BYTE   ^0372
   0E32'  0E24               .WORD   <3$-HEAD>
          0E26  2256                 SUI     7
      D6  0E26               .BYTE   ^0326
      07  0E27               .BYTE   7
          0E28  2257                 CPI     <^X10>
      FE  0E28               .BYTE   ^0376
      10  0E29               .BYTE   ^X10
          0E2A  2258                 JM      3$
      FA  0E2A               .BYTE   ^0372
   0E32'  0E2B               .WORD   <3$-HEAD>
          0E2D  2259                 SET     ERROR                          ;CHAR ABOVE RANGE
      AF  0E2D               .BYTE   ^0250 ! A                    ;with A
      3C  0E2E               .BYTE   ^04 ! <8*A>
      32  0E2F               .BYTE   ^062
   02E2'  0E30               .WORD   <ERROR-HEAD>
          0E32  2260 3$:             RET
      C9  0E32               .BYTE   ^0311
          0E33  2261
          0E33  2262
          0E33  2263 ;*************************************************************************
          0E33  2264 ;
          0E33  2265 ;    SKIP_TO_SPEC
          0E33  2266 ;    THIS ROUTINE SKIPS TO THE NEXT SPECIAL CHAR IN THE INPUT STRING
          0E33  2267 ;    THEN MOVES ONE MORE.(WHICH SHOULD BE THE BEGINING OF THE NEXT WORD.)
          0E33  2268 ;    IT ALSO LEAVES A COUNT IN SKIP_CNT FOR THE NUMBER OF CHARS SPANNED
          0E33  2269 ;    AT END IT MOVES 10 CHARS FROM THE NOW POINTER INTO TEMP_BUF
          0E33  2270 ;
```

```
              0E33  2271 ;  INPUT CONDITIONS:
              0E33  2272 ;        TTBUF_PNT        = POINTS TO CHARS IN THE INPUT LINE
              0E33  2273 ;
              0E33  2274 ;  OUTPUT CONDITIONS:
              0E33  2275 ;        SKIP_CNT         = # CHARS SPANNED  (SEE NOTE)
              0E33  2276 ;        TEMP_BUF         = 10 CHARS FROM POINTER
              0E33  2277 ;        TTBUF_PNT        = NEW POINTER
              0E33  2278 ;        OLD_TTBUF        = CHAR POINTER ON ENTRY (FOR RESET WHEN NO # FOUND)
              0E33  2279 ;
              0E33  2280 ;  NOTE:  SPANNED CHARS COUNT DOES NOT INCLUDE THE SPECIAL CHAR !!!
              0E33  2281 ;
              0E33  2282 ;*****************************************************************************
              0E33  2283
              0E33  2284 SKIP_TO_SPEC:  CLEAR   SKIP_CNT
          AF  0E33            .BYTE    ^0250 ! A                  ;with A
          32  0E34            .BYTE    ^062
       0406'  0E35            .WORD    <SKIP_CNT-HEAD>
              0E37  2285
              0E37  2286               LHLD    TTBUF_PNT                      ;POINTER TO INPUT CHARS
          2A  0E37            .BYTE    ^052
       044D'  0E38            .WORD    <TTBUF_PNT-HEAD>
              0E3A  2287               SHLD    OLD_TTBUF                      ;SAVE OLD POINTER FOR ERRORS
          22  0E3A            .BYTE    ^042
       03CD'  0E3B            .WORD    <OLD_TTBUF-HEAD>
              0E3D  2288
              0E3D  2289               LXI     H,TEMP_BUF                     ;SAVE OLD BUFFER FOR ERRORS
          21  0E3D            .BYTE    <H*8> ! 1
      04'0E'  0E3E            .BYTE    <TEMP_BUF-HEAD>&255 , <<TEMP_BUF-HEAD>&^XFF00>/256
              0E40  2290               LXI     D,OLD_TEMP_BUF
          11  0E40            .BYTE    <D*8> ! 1
      03'C3'  0E41            .BYTE    <OLD_TEMP_BUF-HEAD>&255 , <<OLD_TEMP_BUF-HEAD>&^XFF00>/256
              0E43  2291               MVI     C,10
       0A 0E  0E43            .BYTE    <C*8> ! 6 , 10&255
              0E45  2292               CALL    MOVER_R
          CD  0E45            .BYTE    ^0315
       0F75'  0E46            .WORD    <MOVER_R-HEAD>
              0E48  2293
              0E48  2294 1$:           LHLD    TTBUF_PNT
          2A  0E48            .BYTE    ^052
       044D'  0E49            .WORD    <TTBUF_PNT-HEAD>
              0E4B  2295               MOV     A,M
          7E  0E4B            .BYTE    ^0100 ! <A*8> ! M
              0E4C  2296               CPI     HEX_30                         ;SPEC CHAR ARE <30 HEX
          FE  0E4C            .BYTE    ^0376
          30  0E4D            .BYTE    HEX_30
              0E4E  2297
              0E4E  2298               INX     H                              ;MOVE TO NEXT INPUT CHAR
          23  0E4E            .BYTE    <H*8> ! 3
              0E4F  2299               SHLD    TTBUF_PNT                      ;STORE NEW POINTER.  NOTE:
          22  0E4F            .BYTE    ^042
       044D'  0E50            .WORD    <TTBUF_PNT-HEAD>
              0E52  2300                                                      ; THESE 2 INSTRUCTIONS DO
              0E52  2301                                                      ; NOT AFFECT CONDITION CODES
              0E52  2302               IFPOS                                  ;IF NOT SPECIAL CHAR
          FA  0E52            .BYTE    ^0372
       0E61'  0E53            .WORD    <2033$-HEAD>
              0E55  2303               CPI     HEX_3A                         ;SEE IF : (ALSO SPECIAL CHAR)
      FE  0E55                    .BYTE   ^0376
      3A  0E56                    .BYTE   HEX_3A
          0E57   2304                     JZ      2$                            ;JUMP IF :
      CA  0E57                    .BYTE   ^0312
   0E61'  0E58                    .WORD   <2$-HEAD>
          0E5A   2305                     LXI     H,SKIP_CNT
      21  0E5A                    .BYTE   <H*8> ! 1
 04'06'   0E5B                    .BYTE   <SKIP_CNT-HEAD>&255 , <<SKIP_CNT-HEAD>&^XFF00>/256
          0E5D   2306                     INR     M                             ;INCREMENT SPANNED CHAR CNT
      34  0E5D                    .BYTE   ^04 ! <8*M>
          0E5E   2307                                                           ;IF SPECIAL CHARACTER
          0E5E   2308                     ELSE
      C3  0E5E                    .BYTE   ^0303
   0E6A'  0E5F                    .WORD   <2034$-HEAD>
          0E61        2033$:                                                    ;GENERATE LOCAL SYMBOL NAME
          0E61   2309 2$:                 MVI     C,10
   0A 0E  0E61                    .BYTE   <C*8> ! 6 , 10&255
          0E63   2310                     LXI     D,TEMP_BUF
      11  0E63                    .BYTE   <D*8> ! 1
 04'0E'   0E64                    .BYTE   <TEMP_BUF-HEAD>&255 , <<TEMP_BUF-HEAD>&^XFF00>/256
          0E66   2311                     CALL    MOVER_R                       ;PUT 10 CHARS INTO TEMP_BUF
      CD  0E66                    .BYTE   ^0315
   0F75'  0E67                    .WORD   <MOVER_R-HEAD>
          0E69   2312                     RET                                   ;GET OUT OF LOOP
      C9  0E69                    .BYTE   ^0311
          0E6A   2313
          0E6A   2314                     ENDIF
          0E6A        2034$:                                                    ;GENERATE LCL 2034 NAME
          0E6A   2315
          0E6A   2316                     JMP     1$                            ;LOOP UNTIL SPECIAL CHAR
      C3  0E6A                    .BYTE   ^0303
   0E48'  0E6B                    .WORD   <1$-HEAD>
          0E6D   2317
          0E6D   2318
          0E6D   2319 ;*************************************************************************
          0E6D   2320 ;
          0E6D   2321 ;  READ_WCS_R
          0E6D   2322 ;  THIS ROUTINE READS 3 BYTES OF DATA FROM THE WCS TO CSR_VALUE USING
          0E6D   2323 ;  THE ADDRESS IN WCS_ADDRESS. ALSO A NOP IS PLACED IN THE CSR TO PREVENT
          0E6D   2324 ;  THE MACHINE FROM DOING NASTY THINGS
          0E6D   2325 ;
          0E6D   2326 ;  INPUT CONDITIONS:
          0E6D   2327 ;       WCS_ADDRESS HAS WCS ADDRESS TO READ
          0E6D   2328 ;
          0E6D   2329 ;  OUTPUT CONDITIONS:
          0E6D   2330 ;       CSR_VALUE AND WCS_VALUE CONTAIN THE VALUE OF THE WORD READ
          0E6D   2331 ;
          0E6D   2332 ;*************************************************************************
          0E6D   2333
          0E6D   2334 READ_WCS_R:         LHLD    WCS_ADDRESS                   ;GET ADDRESS TO READ
      2A  0E6D                    .BYTE   ^052
   006C'  0E6E                    .WORD   <WCS_ADDRESS-HEAD>
          0E70   2335                     SHLD    UPC_VALUE
      22  0E70                    .BYTE   ^042
   00C2'  0E71                    .WORD   <UPC_VALUE-HEAD>
          0E73   2336                     CALL    LOAD_UPC_R
      CD  0E73                    .BYTE   ^0315
   0F19'  0E74              .WORD   <LOAD_UPC_R-HEAD>
          0E76  2337
          0E76  2338                CALL    NOP_CSR_R
      CD  0E76              .BYTE   ^0315
   0ECA'  0E77              .WORD   <NOP_CSR_R-HEAD>
          0E79  2339
          0E79  2340                OUT     SETSS                   ;SING STEP MACHINE TO GET
   23 D3  0E79              .BYTE   ^0323 , SETSS&255       ;register A
          0E7B  2341                OUT     CLRSS                   ;WCS VALUE INTO CSR
   22 D3  0E7B              .BYTE   ^0323 , CLRSS&255       ;register A
          0E7D  2342
          0E7D  2343                CALL    LOAD_CSR_R              ;READ IT OUT
      CD  0E7D              .BYTE   ^0315
   0EE7'  0E7E              .WORD   <LOAD_CSR_R-HEAD>
          0E80  2344
          0E80  2345                LXI     H,CSR_VALUE
      21  0E80              .BYTE   <H*8> ! 1
  00'B8'  0E81              .BYTE   <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
          0E83  2346                LXI     D,WCS_VALUE
      11  0E83              .BYTE   <D*8> ! 1
  00'B4'  0E84              .BYTE   <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
          0E86  2347                CALL    MOVER_3_R
      CD  0E86              .BYTE   ^0315
   0F5F'  0E87              .WORD   <MOVER_3_R-HEAD>
          0E89  2348
          0E89  2349                RET
      C9  0E89              .BYTE   ^0311
          0E8A  2350
          0E8A  2351 ;*****************************************************************************
          0E8A  2352 ;
          0E8A  2353 ;  WRITE_WCS_R
          0E8A  2354 ;  THIS ROUTINE WRITES 3 BYTES OF DATA TO THE WCS FROM WCS_VALUE
          0E8A  2355 ;  BEFORE THE WRITE OCCURES PARITY IS CALCULATED ON THAT 3 BYTE WCS WORD
          0E8A  2356 ;  AND PLACED IN BIT 23.
          0E8A  2357 ;
          0E8A  2358 ;  INPUT CONDITIONS:
          0E8A  2359 ;       WCS_ADDRESS HAS WCS ADDRESS TO READ
          0E8A  2360 ;       WCS_BAD_PARITY = 0 FOR GOOD PARITY, 1 FOR BAD PARITY
          0E8A  2361 ;       PARITY_ON = 0 FOR NO PARITY CALC, 1 TO CALCULATE PARITY
          0E8A  2362 ;
          0E8A  2363 ;*****************************************************************************
          0E8A  2364
          0E8A  2365 WRITE_WCS_R:     LHLD    WCS_ADDRESS             ;GET ADDRESS TO WRITE
      2A  0E8A              .BYTE   ^052
   006C'  0E8B              .WORD   <WCS_ADDRESS-HEAD>
          0E8D  2366                SHLD    UPC_VALUE
      22  0E8D              .BYTE   ^042
   00C2'  0E8E              .WORD   <UPC_VALUE-HEAD>
          0E90  2367                CALL    LOAD_UPC_R
      CD  0E90              .BYTE   ^0315
   0F19'  0E91              .WORD   <LOAD_UPC_R-HEAD>
          0E93  2368
          0E93  2369                CALL    NOP_CSR_R               ;KEEP MACHINE IDLE.
      CD  0E93              .BYTE   ^0315
   0ECA'  0E94              .WORD   <NOP_CSR_R-HEAD>
          0E96  2370
          0E96  2371                SET     WCS_CALC                ;PARITY CALC ON WCS
      AF  0E96              .BYTE   ^0250 ! A                   ;with A
      3C  0E97              .BYTE   ^04 ! <8*A>
      32  0E98              .BYTE   ^062
   058A'  0E99              .WORD   <WCS_CALC-HEAD>
          0E9B   2372               LXI     H,WCS_VALUE                 ;CALC PARITY ON WCS WORD
      21  0E9B              .BYTE   <H*8> ! 1
   00'B4' 0E9C              .BYTE   <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
          0E9E   2373               CALL    PARITY_CALC
      CD  0E9E              .BYTE   ^0315
   0BC8'  0E9F              .WORD   <PARITY_CALC-HEAD>
          0EA1   2374               CLEAR   WCS_CALC                    ;CLEAR FLAG
      AF  0EA1              .BYTE   ^0250 ! A                   ;with A
      32  0EA2              .BYTE   ^062
   058A'  0EA3              .WORD   <WCS_CALC-HEAD>
          0EA5   2375
          0EA5   2376               LXI     H,WCS_VALUE+2
      21  0EA5              .BYTE   <H*8> ! 1
   00'B6' 0EA6              .BYTE   <WCS_VALUE+2-HEAD>&255 , <<WCS_VALUE+2-HEAD>&^XFF00>/256
          0EA8   2377               MOV     A,M                         ;GET LOW BYTE
      7E  0EA8              .BYTE   ^0100 ! <A*8> ! M
          0EA9   2378
          0EA9   2379               OUT     WCSB0                       ;CLOCK INTO BYTE 0 OF LATCH
   08 D3  0EA9              .BYTE   ^0323 , WCSB0&255           ;register A
          0EAB   2380               DCX     H                           ;INC POINTER TO NEXT BYTE
      2B  0EAB              .BYTE   <H*8> ! 11
          0EAC   2381
          0EAC   2382               MOV     A,M                         ;GET MIDDLE BYTE
      7E  0EAC              .BYTE   ^0100 ! <A*8> ! M
          0EAD   2383               OUT     WCSB1                       ;CLOCK INTO BYTE 1 OF LATCH
   09 D3  0EAD              .BYTE   ^0323 , WCSB1&255           ;register A
          0EAF   2384               DCX     H                           ;INC POINTER TO NEXT BYTE
      2B  0EAF              .BYTE   <H*8> ! 11
          0EB0   2385
          0EB0   2386               MOV     A,M                         ;GET HIGH BYTE
      7E  0EB0              .BYTE   ^0100 ! <A*8> ! M
          0EB1   2387               OUT     WCSB2                       ;CLOCK INTO BYTE 2 OF LATCH
   0A D3  0EB1              .BYTE   ^0323 , WCSB2&255           ;register A
          0EB3   2388
          0EB3   2389               OUT     SETWCK                      ;CLOCK 24 BITS INTO WCS
   37 D3  0EB3              .BYTE   ^0323 , SETWCK&255          ;register A
          0EB5   2390               OUT     CLRWCK                      ;CLEAR WCS CLOCK
   36 D3  0EB5              .BYTE   ^0323 , CLRWCK&255          ;register A
          0EB7   2391               RET
      C9  0EB7              .BYTE   ^0311
          0EB8   2392
          0EB8   2393
          0EB8   2394   ;*****************************************'**************************
          0EB8   2395   ;
          0EB8   2396   ;  SHIFTER_R
          0EB8   2397   ;  THIS ROUTINE SHIFTS N BYTES OF DATA LEFT 1 BIT AT THE ADDRESS POINTED
          0EB8   2398   ;  TO BY  SHIFT_PNT.
          0EB8   2399   ;
          0EB8   2400   ;  INPUT CONDITIONS:
          0EB8   2401   ;           SHIFT_PNT = POINTS TO COUNT OF NUMBER OF BYTES TO SHIFT
          0EB8   2402   ;                       DATA TO BE SHIFTED FOLLOWS IN NEXT N BYTES
          0EB8   2403   ;
          0EB8   2404   ;  CARRY BIT GETS MSB, CARRY MAY ALSO BE USED AS
```

```
              0EB8  2405 ;  INPUT TO THE SHIFT
              0EB8  2406 ;
              0EB8  2407 ;**********************************************************************
              0EB8  2408
              0EB8  2409 SHIFTER_R:        PUSH    $PSW                  ;SAVE CARRY
         F5   0EB8                 .BYTE   ^0305 ! <8*$PSW>
              0EB9  2410                   LHLD    SHIFT_PNT             ;POINTER TO SHIFT DATA
         2A   0EB9                 .BYTE   ^052
      0068'   0EBA                 .WORD   <SHIFT_PNT-HEAD>
              0EBC  2411                   MOV     C,M                   ;GET COUNT IN BYTES
         4E   0EBC                 .BYTE   ^0100 ! <C*8> ! M
              0EBD  2412                   MVI     B,0                   ;MAKE COUNT IN REG PAIR
      00 06   0EBD                 .BYTE   <B*8> ! 6 , 0&255
              0EBF  2413                   DAD     B                     ;ADD COUNT , GOTO LAST BYTE
         09   0EBF                 .BYTE   <B*8> ! 9
              0EC0  2414                   POP     $PSW
         F1   0EC0                 .BYTE   ^0301 ! <8*$PSW>
              0EC1  2415
              0EC1  2416 SHIFTER1_R:       MOV     A,M                   ;MOVE BYTE 1 LEFT
         7E   0EC1                 .BYTE   ^0100 ! <A*8> ! M
              0EC2  2417                   RAL                           ;CARRY = ROTATE IN BIT NEXT BTYE
         17   0EC2                 .BYTE   ^027
              0EC3  2418                   MOV     M,A
         77   0EC3                 .BYTE   ^0100 ! <M*8> ! A
              0EC4  2419                   DCR     C                     ;DEC BYTE COUNT
         0D   0EC4                 .BYTE   ^05 ! <8*C>
              0EC5  2420                   RZ                            ;RETURN IF ZERO
         C8   0EC5                 .BYTE   ^0310
              0EC6  2421                   DCX     H                     ;MOVE POINTER TO NEXT BYTE
         2B   0EC6                 .BYTE   <H*8> ! 11
              0EC7  2422
              0EC7  2423                   JMP     SHIFTER1_R            ;REPEAT UNTIL BYTE COUNT=0
         C3   0EC7                 .BYTE   ^0303
      0EC1'   0EC8                 .WORD   <SHIFTER1_R-HEAD>
              0ECA  2424
              0ECA  2425 ;*********************************************************************
              0ECA  2426 ;
              0ECA  2427 ;  NOP_CSR_R:
              0ECA  2428 ;  THIS ROUTINE LOAD A NOP INTO THE CSR
              0ECA  2429 ;
              0ECA  2430 ;*********************************************************************
              0ECA  2431
              0ECA  2432 NOP_CSR_R:        LXI     H,NOP_INST
         21   0ECA                 .BYTE   <H*8> ! 1
    00'72'    0ECB                 .BYTE   <NOP_INST-HEAD>&255 , <<NOP_INST-HEAD>&^XFF00>/256
              0ECD  2433                   LXI     D,CSR_VALUE
         11   0ECD                 .BYTE   <D*8> ! 1
    00'B8'    0ECE                 .BYTE   <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
              0ED0  2434                   CALL    MOVER_3_R                     ;MOVE NOP TO CSR SAVE AREA
         CD   0ED0                 .BYTE   ^0315
      0F5F'   0ED1                 .WORD   <MOVER_3_R-HEAD>
              0ED3  2435                   LDA     PARITY_ON                     ;SAVE PARITY ON FLAG
         3A   0ED3                 .BYTE   ^072
      0064'   0ED4                 .WORD   <PARITY_ON-HEAD>
              0ED6  2436                   STA     TEMP_BYTE                     ;STORE IN TEMP BYTE
         32   0ED6                 .BYTE   ^062
      0418'   0ED7                 .WORD   <TEMP_BYTE-HEAD>
```

```
         0ED9  2437                    CLEAR   PARITY_ON                       ;CALC NO PARITY ON NOP
     AF  0ED9              .BYTE       ^0250 ! A                ;with A
     32  0EDA              .BYTE       ^062
  0064'  0EDB              .WORD       <PARITY_ON-HEAD>
         0EDD  2438
         0EDD  2439                    CALL    LOAD_CSR_R                      ;LOAD IT
     CD  0EDD              .BYTE       ^0315
  0EE7'  0EDE              .WORD       <LOAD_CSR_R-HEAD>
         0EE0  2440
         0EE0  2441                    LDA     TEMP_BYTE                       ;GET OLD PARITY_ON FLAG
     3A  0EE0              .BYTE       ^072
  0418'  0EE1              .WORD       <TEMP_BYTE-HEAD>
         0EE3  2442                    STA     PARITY_ON                       ;RESTORE FLAG
     32  0EE3              .BYTE       ^062
  0064'  0EE4              .WORD       <PARITY_ON-HEAD>
         0EE6  2443
         0EE6  2444                    RET
     C9  0EE6              .BYTE       ^0311
         0EE7  2445
         0EE7  2446
         0EE7  2447 ;*********************************************************************
         0EE7  2448 ;
         0EE7  2449 ;   LOAD_CSR_R
         0EE7  2450 ;   THIS ROUTINE LOADS THE CSR FROM THE CSR_VALUE AREA,
         0EE7  2451 ;   ALSO CSR_VALUE AREA GETS THE VALUE OF THE CSR
         0EE7  2452 ;
         0EE7  2453 ;*********************************************************************
         0EE7  2454
         0EE7  2455 LOAD_CSR_R:            OUT     VSHIFT                          ;SET V-BUS SHIFT MODE
  A2 D3  0EE7              .BYTE       ^0323 , VSHIFT&255       ;register A
         0EE9  2456
         0EE9  2457                    LXI     H,CSR_VALUE                     ;CALC PARITY ON NEW CSR VALUE
     21  0EE9              .BYTE       <H*8> ! 1
00'B8'   0EEA              .BYTE       <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
         0EEC  2458                    CALL    PARITY_CALC
     CD  0EEC              .BYTE       ^0315
  0BC8'  0EED              .WORD       <PARITY_CALC-HEAD>
         0EEF  2459
         0EEF  2460                    DO      24                              ;SHIFT 24 BITS
     21  0EEF              .BYTE       <H*8> ! 1
00'55'   0EF0              .BYTE       <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46  0EF2              .BYTE       ^0100 ! <B*8> ! M
     C5  0EF3              .BYTE       ^0305 ! <8*B>
  18 3E  0EF4              .BYTE       <A*8> ! 6 , 24&255
     77  0EF6              .BYTE       ^0100 ! <M*8> ! A
         0EF7       2035$:
         0EF7  2461
         0EF7  2462                    IN      CSR23                           ;GET OLD CSR DATA
  87 DB  0EF7              .BYTE       ^0333 , CSR23&255        ;to register A
         0EF9  2463                    RAR                                     ;PUT CSR 23 IN CARRY
     1F  0EF9              .BYTE       ^037
         0EFA  2464                    LXI     H,CSR_VALUE+2                   ;POINTER TO LAST CSR DATA BYTE
     21  0EFA              .BYTE       <H*8> ! 1
00'BA'   0EFB              .BYTE       <CSR_VALUE+2-HEAD>&255 , <<CSR_VALUE+2-HEAD>&^XFF00>/256
         0EFD  2465                    MVI     C,3                             ;BYTES TO SHIFT
  03 0E  0EFD              .BYTE       <C*8> ! 6 , 3&255
         0EFF  2466                    CALL    SHIFTER1_R                      ;CARRY = MSB OF NEW CSR DATA ON
```

```
       CD  0EFF               .BYTE   ^0315
    0EC1'  0F00               .WORD   <SHIFTER1_R-HEAD>
           0F02  2467                                                  ; RETURN
           0F02  2468
           0F02  2469                 OUT     CLRCSR                   ;CLEAR CSR INPUT
    38 D3  0F02               .BYTE   ^0323 , CLRCSR&255      ;register A
           0F04  2470                 JNC     1$                       ;DON'T SET INPUT IF CARRY CLEAR
       D2  0F04               .BYTE   ^0322
    0F09'  0F05               .WORD   <1$-HEAD>
           0F07  2471                 OUT     SETCSR                   ;ELSE SET CSR INPUT
    39 D3  0F07               .BYTE   ^0323 , SETCSR&255      ;register A
           0F09  2472
           0F09  2473 1$:             OUT     SETCSK                   ;SET UPC CLOCK
    25 D3  0F09               .BYTE   ^0323 , SETCSK&255      ;register A
           0F0B  2474                 OUT     CLRCSK                   ;CLEAR UPC CLOCK
    24 D3  0F0B               .BYTE   ^0323 , CLRCSK&255      ;register A
           0F0D  2475
           0F0D  2476                 ENDDO
       21  0F0D               .BYTE   <H*8> ! 1
  00'55'   0F0E               .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       35  0F10               .BYTE   ^05 ! <8*M>
       C2  0F11               .BYTE   ^0302
    0EF7'  0F12               .WORD   <2035$-HEAD>
       C1  0F14               .BYTE   ^0301 ! <8*B>
       70  0F15               .BYTE   ^0100 ! <M*8> ! B
           0F16  2477
           0F16  2478                 OUT     VNORML                   ;SET V-BUS TO NORMAL MODE
    A3 D3  0F16               .BYTE   ^0323 , VNORML&255      ;register A
           0F18  2479
           0F18  2480                 RET
       C9  0F18               .BYTE   ^0311
           0F19  2481
           0F19  2482
           0F19  2483 ;*******************************************************************
           0F19  2484 ;
           0F19  2485 ;  LOAD_UPC_R
           0F19  2486 ;  THIS ROUTINE LOADS THE UPC FROM THE UPC_VALUE AREA,
           0F19  2487 ;  ALSO UPC_VALUE AREA GETS THE VALUE OF THE UPC
           0F19  2488 ;
           0F19  2489 ;*******************************************************************
           0F19  2490
           0F19  2491 LOAD_UPC_R:     OUT     VSHIFT                   ;SET V-BUS SHIFT MODE
    A2 D3  0F19               .BYTE   ^0323 , VSHIFT&255      ;register A
           0F1B  2492
           0F1B  2493                 LXI     H,UPC_SHIFT              ;POINTER TO UPC DATA BUFF
       21  0F1B               .BYTE   <H*8> ! 1
  00'C1'   0F1C               .BYTE   <UPC_SHIFT-HEAD>&255 , <<UPC_SHIFT-HEAD>&^XFF00>/256
           0F1E  2494                 SHLD    SHIFT_PNT
       22  0F1E               .BYTE   ^042
    0068'  0F1F               .WORD   <SHIFT_PNT-HEAD>
           0F21  2495
           0F21  2496                 ORA     A                        ;CLEAR CARRY
       B7  0F21               .BYTE   ^0260 ! A
           0F22  2497
           0F22  2498                 CALL    SHIFTER_R                ;LEFT JUST. 15 BITS
       CD  0F22               .BYTE   ^0315
    0EB8'  0F23               .WORD   <SHIFTER_R-HEAD>
```

```
            0F25
            0F25                      DO      15                                  ;SHIFT 15 BITS
       21   0F25            .BYTE     <H*8> ! 1
  00'55'    0F26            .BYTE     <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       46   0F28            .BYTE     ^0100 ! <B*8> ! M
       C5   0F29            .BYTE     ^0305 ! <8*B>
    0F 3E   0F2A            .BYTE     <A*8> ! 6 , 15&255
       77   0F2C            .BYTE     ^0100 ! <M*8> ! A
            0F2D     2036$:
            0F2D
            0F2D                      IN      UPC14
    84 DB   0F2D            .BYTE     ^0333 , UPC14&255           ;to register A
            0F2F                      RAR                                         ;PUT UPC14 IN CARRY
       1F   0F2F            .BYTE     ^037
            0F30                      CALL    SHIFTER_R                           ;CARRY = MSB ON RET
       CD   0F30            .BYTE     ^0315
    0EB8'   0F31            .WORD     <SHIFTER_R-HEAD>
            0F33
            0F33                      OUT     CLRUPC                              ;SET = 0 UPC SER IN
    A8 D3   0F33            .BYTE     ^0323 , CLRUPC&255          ;register A
            0F35                      IFC
       D2   0F35            .BYTE     ^0322
    0F3A'   0F36            .WORD     <2037$-HEAD>
            0F38                      OUT     SETUPC                              ;SET = 1 UPC SER IN
    A9 D3   0F38            .BYTE     ^0323 , SETUPC&255          ;register A
            0F3A                      ENDIF
            0F3A     2037$:                                                       ;GENERATE LCL 2037 NAME
            0F3A
            0F3A                      OUT     SETUPK                              ;SET UPC CLOCK
    27 D3   0F3A            .BYTE     ^0323 , SETUPK&255          ;register A
            0F3C                      OUT     CLRUPK                              ;CLEAR UPC CLOCK
    26 D3   0F3C            .BYTE     ^0323 , CLRUPK&255          ;register A
            0F3E
            0F3E                      ENDDO
       21   0F3E            .BYTE     <H*8> ! 1
  00'55'    0F3F            .BYTE     <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       35   0F41            .BYTE     ^05 ! <8*M>
       C2   0F42            .BYTE     ^0302
    0F2D'   0F43            .WORD     <2036$-HEAD>
       C1   0F45            .BYTE     ^0301 ! <8*B>
       70   0F46            .BYTE     ^0100 ! <M*8> ! B
            0F47
            0F47                      OUT     VNORML                              ;SET V-BUS TO NORMAL MODE
    A3 D3   0F47            .BYTE     ^0323 , VNORML&255          ;register A
            0F49
            0F49                      OUT     CLRACK                              ;CLEAR CONSOLE ACKNOWLEDGE
    A9 D3   0F49            .BYTE     ^0323 , CLRACK&255          ;register A
            0F4B                      IF      SETACK_FLG                          ;MUST SET UP CONSOLE ACKNOWLEDE
       3A   0F4B            .BYTE     ^072
    0405'   0F4C            .WORD     <SETACK_FLG-HEAD>
       0F   0F4E            .BYTE     ^017
       D2   0F4F            .BYTE     ^0322
    0F54'   0F50            .WORD     <2038$-HEAD>
            0F52                                                                  ;BEFORE RETURNING
            0F52                      OUT     SETACK                              ;SET CONSOLE ACKNOWLEDGE IF
    A8 D3   0F52            .BYTE     ^0323 , SETACK&255          ;register A
            0F54                                                                  ; FLAG SET
```

```
           0F54                       ENDIF
           0F54        2038$:                                          ;GENERATE LCL 2038 NAME
           0F54
           0F54                       RET
      C9   0F54                .BYTE  ^0311
           0F55
           0F55
           0F55        ;***********************************************************************************
           0F55        ;
           0F55        ;  COMPARE_R
           0F55        ;  THIS ROUTINE IS USED BY THE STRUCTURED MACRO SET AND MAY ALSO
           0F55        ;  BE CALLED DIRECTLY.
           0F55        ;
           0F55        ;  INPUT CONDITIONS:
           0F55        ;        H + L     = POINTER TO DATA FIELD 1
           0F55        ;        D + E     = POINTER TO DATA FIELD 2
           0F55        ;        C         = COUNT IN BYTES FOR COMPARISON
           0F55        ;
           0F55        ;  OUTPUT CONDITIONS:
           0F55        ;        CONDITIONS CODES ARE SET
           0F55        ;
           0F55        ;***********************************************************************************
           0F55
           0F55        COMPARE_R:     LDAX     D                       ;FIELD 2 BYTE
      1A   0F55                .BYTE  <D*8> ! 10
           0F56                       CMP      M                       ;COMPARED TO FIELD 1 BYTE
      BE   0F56                .BYTE  ^0270 ! M
           0F57                       RNZ                              ;RETURN WITH CC NON ZERO IF NOT SAME
      C0   0F57                .BYTE  ^0300
           0F58                       INX      H                       ;INCREMENT FIELD 1 POINTER
      23   0F58                .BYTE  <H*8> ! 3
           0F59                       INX      D                       ;INCREMENT FIELD 2 POINTER
      13   0F59                .BYTE  <D*8> ! 3
           0F5A                       DCR      C                       ;DECREMENT COUNT
      0D   0F5A                .BYTE  ^05 ! <8*C>
           0F5B                       JNZ      COMPARE_R               ;LOOP UNTIL COUNT GONE
      C2   0F5B                .BYTE  ^0302
   0F55'   0F5C                .WORD  <COMPARE_R-HEAD>
           0F5E                       RET                              ;DONE - RETURN ZERO CC
      C9   0F5E                .BYTE  ^0311
           0F5F
           0F5F
           0F5F        ;***********************************************************************************
           0F5F        ;
           0F5F        ;   MOVER_R
           0F5F        ;
           0F5F        ;   THIS ROUTINE MOVES DATA FROM THE ADDRESS GIVEN IN H+L TO THE ADDRESS
           0F5F        ;   GIVEN IN D+E FOR THE COUNT IN C
           0F5F        ;
           0F5F        ;   INPUT CONDITIONS:
           0F5F        ;        H+L      = SOURCE ADDRESS
           0F5F        ;        D+E      = DEST. ADDRESS
           0F5F        ;        C        = LENGTH
           0F5F        ;
           0F5F        ;   OUTPUT CONDITIONS:
           0F5F        ;        REGISTERS ARE INCREMENTED DURING THE MOVE, SO THEY
           0F5F        ;        ARE POINTING TO THE LOCATION AFTER THE DATA
```

```
               0F5F  2569 ;
               0F5F  2570 ;************************************************************************
               0F5F  2571
               0F5F  2572 MOVER_3_R:      MVI     C,3                             ;MOVE 3 TO COUNT
       03 0E   0F5F                .BYTE   <C*8> ! 6 , 3&255
               0F61  2573                 JMP     MOVER_R                         ;GO MOVE THREE BYTES
          C3   0F61                .BYTE   ^0303
       0F75'   0F62                .WORD   <MOVER_R-HEAD>
               0F64  2574
               0F64  2575 MOV_INPUT_DATA0:
               0F64  2576                 LXI     H,INPUT_NUM                     ;SOURCE IN INPUT_NUM
          21   0F64                .BYTE   <H*8> ! 1
     06'76'    0F65                .BYTE   <INPUT_NUM-HEAD>&255 , <<INPUT_NUM-HEAD>&^XFF00>/256
               0F67  2577                 LXI     D,DATA0                         ;DEST IS DATA0-DATA3
          11   0F67                .BYTE   <D*8> ! 1
     00'A9'    0F68                .BYTE   <DATA0-HEAD>&255 , <<DATA0-HEAD>&^XFF00>/256
               0F6A  2578                 JMP     MOVER_4_R                       ;MOVE 4 BYTES
          C3   0F6A                .BYTE   ^0303
       0F73'   0F6B                .WORD   <MOVER_4_R-HEAD>
               0F6D  2579
               0F6D  2580 MOV_DATA0_HEXBUF:
               0F6D  2581                 LXI     D,HEX_BUF                       ;DESTINATION IS HEX_BUF
          11   0F6D                .BYTE   <D*8> ! 1
     00'5B'    0F6E                .BYTE   <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
               0F70  2582 MOV_FROM_DATA0: LXI     H,DATA0                         ;SOURCE IS DATA0-3
          21   0F70                .BYTE   <H*8> ! 1
     00'A9'    0F71                .BYTE   <DATA0-HEAD>&255 , <<DATA0-HEAD>&^XFF00>/256
               0F73  2583
               0F73  2584 MOVER_4_R:      MVI     C,4                             ;MOVE 4 TO COUNT
       04 0E   0F73                .BYTE   <C*8> ! 6 , 4&255
               0F75  2585 MOVER_R:        MOV     A,M                             ;GET SOURCE DATA
          7E   0F75                .BYTE   ^0100 ! <A*8> ! M
               0F76  2586                 STAX    D                               ;PUT AT DESTINATION
          12   0F76                .BYTE   <D*8> ! 2
               0F77  2587                 INX     H
          23   0F77                .BYTE   <H*8> ! 3
               0F78  2588                 INX     D                               ;INCREMENT POINTERS
          13   0F78                .BYTE   <D*8> ! 3
               0F79  2589                 DCR     C                               ;DECREMENT COUNT
          0D   0F79                .BYTE   ^05 ! <8*C>
               0F7A  2590                 RZ                                      ;RETURN IF DONE
          C8   0F7A                .BYTE   ^0310
               0F7B  2591                 JMP     MOVER_R                         ;LOOP OTHERWISE
          C3   0F7B                .BYTE   ^0303
       0F75'   0F7C                .WORD   <MOVER_R-HEAD>
               0F7E  2592
               0F7E  2593
               0F7E  2594
               0F7E  2595 ;************************************************************************
               0F7E  2596 ;
               0F7E  2597 ;   PRINT_FLG
               0F7E  2598 ;   THIS ROUTINE PRINTS 5 CHARS AND A SPACE FROM THE POINTER TEMP_WORD
               0F7E  2599 ;
               0F7E  2600 ;************************************************************************
               0F7E  2601
               0F7E  2602 PRINT_FLG:      LHLD    TEMP_WORD                       ;POINTER TO FLAG TO PRINT
          2A   0F7E                .BYTE   ^052
```

```
      0419'  0F7F                 .WORD   <TEMP_WORD-HEAD>
             0F81   2603                  MVI     C,5
      05 0E  0F81                 .BYTE   <C*8> ! 6 , 5&255
             0F83   2604                  CALL    PRINTER                       ;PRINT THE 5 CHAR
         CD  0F83                 .BYTE   ^0315
      1007'  0F84                 .WORD   <PRINTER-HEAD>
             0F86   2605                  CALL    SPACE_R                       ;AND THE SPACE
         CD  0F86                 .BYTE   ^0315
      1021'  0F87                 .WORD   <SPACE_R-HEAD>
             0F89   2606
             0F89   2607                  RET
         C9  0F89                 .BYTE   ^0311
             0F8A   2608
             0F8A   2609
             0F8A   2610 ;*************************************************************************************
             0F8A   2611 ;
             0F8A   2612 ;  PRINT_HEX_R
             0F8A   2613 ;  THIS ROUTINE PRINTS HEX NUMBERS
             0F8A   2614 ;
             0F8A   2615 ;  INPUT CONDITIONS:
             0F8A   2616 ;        C = NUMBER OF BYTES TO BE PRINTED
             0F8A   2617 ;        DATA IS IN HEX_BUF
             0F8A   2618 ;
             0F8A   2619 ;*************************************************************************************
             0F8A   2620
             0F8A   2621 PRINT_HEX_4:     MVI     C,4                           ;LOAD BYTE COUNT WITH 4
      04 0E  0F8A                 .BYTE   <C*8> ! 6 , 4&255
             0F8C   2622                  JMP     PRINT_HEX_R                   ;PRINT FOUR CHARS
         C3  0F8C                 .BYTE   ^0303
      0F96'  0F8D                 .WORD   <PRINT_HEX_R-HEAD>
             0F8F   2623
             0F8F   2624 PRINT_HEX_2:     MVI     C,2                           ;BYTE COUNT OF 2
      02 0E  0F8F                 .BYTE   <C*8> ! 6 , 2&255
             0F91   2625                  JMP     PRINT_HEX_R                   ;PRINT 2 CHARS
         C3  0F91                 .BYTE   ^0303
      0F96'  0F92                 .WORD   <PRINT_HEX_R-HEAD>
             0F94   2626
             0F94   2627 PRINT_HEX_1_R:   MVI     C,1                           ;PRINT 1 CHAR
      01 0E  0F94                 .BYTE   <C*8> ! 6 , 1&255
             0F96   2628 PRINT_HEX_R:     LXI     H,HEX_BUF
         21  0F96                 .BYTE   <H*8> ! 1
    00'5B'   0F97                 .BYTE   <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
             0F99   2629                  SHLD    PRINT_PNT                     ;POINTER TO PRINT DATA
         22  0F99                 .BYTE   ^042
      03EE'  0F9A                 .WORD   <PRINT_PNT-HEAD>
             0F9C   2630                  MOV     A,C
         79  0F9C                 .BYTE   ^0100 ! <A*8> ! C
             0F9D   2631                  STA     PRINT_CNT                     ;PRINT COUNT
         32  0F9D                 .BYTE   ^062
      03EC'  0F9E                 .WORD   <PRINT_CNT-HEAD>
             0FA0   2632
             0FA0   2633 1$:              LHLD    PRINT_PNT
         2A  0FA0                 .BYTE   ^052
      03EE'  0FA1                 .WORD   <PRINT_PNT-HEAD>
             0FA3   2634                  MOV     A,M                           ;GET FIRST BYTE
         7E  0FA3                 .BYTE   ^0100 ! <A*8> ! M
             0FA4   2635                  RAR
      1F  0FA4                 .BYTE   ^037
          0FA5  2636                   RAR
      1F  0FA5                 .BYTE   ^037
          0FA6  2637                   RAR
      1F  0FA6                 .BYTE   ^037
          0FA7  2638                   RAR
      1F  0FA7                 .BYTE   ^037
          0FA8  2639                   ANI     <^XF>                   ;GET FIRST NIBBLE
      E6  0FA8                 .BYTE   ^0346
      0F  0FA9                 .BYTE   ^XF
          0FAA  2640                   CALL    PR_HEX_DIGIT            ;PRINT HEX DIGIT
      CD  0FAA                 .BYTE   ^0315
   0FC9'  0FAB                 .WORD   <PR_HEX_DIGIT-HEAD>
          0FAD  2641
          0FAD  2642                   LHLD    PRINT_PNT
      2A  0FAD                 .BYTE   ^052
   03EE'  0FAE                 .WORD   <PRINT_PNT-HEAD>
          0FB0  2643                   MOV     A,M
      7E  0FB0                 .BYTE   ^0100 ! <A*8> ! M
          0FB1  2644                   INX     H
      23  0FB1                 .BYTE   <H*8> ! 3
          0FB2  2645                   SHLD    PRINT_PNT
      22  0FB2                 .BYTE   ^042
   03EE'  0FB3                 .WORD   <PRINT_PNT-HEAD>
          0FB5  2646                   ANI     <^XF>                   ;GET SECOND NIBBLE
      E6  0FB5                 .BYTE   ^0346
      0F  0FB6                 .BYTE   ^XF
          0FB7  2647                   CALL    PR_HEX_DIGIT
      CD  0FB7                 .BYTE   ^0315
   0FC9'  0FB8                 .WORD   <PR_HEX_DIGIT-HEAD>
          0FBA  2648
          0FBA  2649                   LXI     H,PRINT_CNT             ;DECR PRINT COUNT
      21  0FBA                 .BYTE   <H*8> ! 1
  03'EC'  0FBB                 .BYTE   <PRINT_CNT-HEAD>&255 , <<PRINT_CNT-HEAD>&^XFF00>/256
          0FBD  2650                   DCR     M
      35  0FBD                 .BYTE   ^05 ! <8*M>
          0FBE  2651                   JNZ     1$                      ;RETURN IF DONE
      C2  0FBE                 .BYTE   ^0302
   0FA0'  0FBF                 .WORD   <1$-HEAD>
          0FC1  2652
          0FC1  2653                   LDA     NO_SPACE                ;GET FLAG
      3A  0FC1                 .BYTE   ^072
   03C1'  0FC2                 .WORD   <NO_SPACE-HEAD>
          0FC4  2654                   ORA     A                       ;SET CONDITION CODES
      B7  0FC4                 .BYTE   ^0260 ! A
          0FC5  2655                   CZ      SPACE_R                 ;PRINT SPACE IF NO FLAG
      CC  0FC5                 .BYTE   ^0314
   1021'  0FC6                 .WORD   <SPACE_R-HEAD>
          0FC8  2656                   RET
      C9  0FC8                 .BYTE   ^0311
          0FC9  2657
          0FC9  2658
          0FC9  2659 ;*****************************************************************************
          0FC9  2660 ;
          0FC9  2661 ;  PR HEX_DIGIT
          0FC9  2662 ;  THIS ROUTINE PRINTS A HEX DIGIT
          0FC9  2663 ;  THE HEX NUMBER IS IN THE AC.
```

```
            0FC9  2664 ;
            0FC9  2665 ;***************************************************************************
            0FC9  2666
            0FC9  2667 PR_HEX_DIGIT:   ADI     HEX_30                          ;ADD FOR 0-9 TO ASCII
      C6    0FC9               .BYTE   ^0306
      30    0FCA               .BYTE   HEX_30
            0FCB  2668                 CPI     HEX_3A                          ;GREATER THAN 9 ?
      FE    0FCB               .BYTE   ^0376
      3A    0FCC               .BYTE   HEX_3A
            0FCD  2669                 JM      1$
      FA    0FCD               .BYTE   ^0372
   0FD2'    0FCE               .WORD   <1$-HEAD>
            0FD0  2670                 ADI     HEX_7                           ;ADD FOR A-F
      C6    0FD0               .BYTE   ^0306
      07    0FD1               .BYTE   HEX_7
            0FD2  2671 1$:             CALL    TYPE_CHAR                       ;PRINT ASCII CHAR
      CD    0FD2               .BYTE   ^0315
   1027'    0FD3               .WORD   <TYPE_CHAR-HEAD>
            0FD5  2672                 RET
      C9    0FD5               .BYTE   ^0311
            0FD6  2673
            0FD6  2674
            0FD6  2675 ;***************************************************************************
            0FD6  2676 ;
            0FD6  2677 ;   PRINT_PROMPT
            0FD6  2678 ;
            0FD6  2679 ;   THIS ROUTINE PRINTS THE PROMPT ON THE CONSOLE PORT
            0FD6  2680 ;   THIS ROUTINE ALSO CALCULATES A CHECKSUM AND COMPARES IT TO THE CHECKSUM
            0FD6  2681 ;   CALCULATED WHEN THE PROGRAM WAS STARTED. IF THEY ARE NOT THE SAME
            0FD6  2682 ;   AN ERROR IS PRINTED
            0FD6  2683 ;
            0FD6  2684 ;***************************************************************************
            0FD6  2685
            0FD6  2686 PRINT_PROMPT:   CLEAR   OFLAG                           ;CLEAR CONTROL O FLAG IN BOOT
      AF    0FD6               .BYTE   ^0250 ! A               ;with A
      32    0FD7               .BYTE   ^062
   40BB     0FD8               .WORD   <OFLAG-HEAD>
            0FDA  2687                                                         ; BLOCK
            0FDA  2688                 CLEAR   ERROR_CON                       ;CLEAR 8085 ERROR LOOP FLAG
      AF    0FDA               .BYTE   ^0250 ! A               ;with A
      32    0FDB               .BYTE   ^062
   0057'    0FDC               .WORD   <ERROR_CON-HEAD>
            0FDE  2689
            0FDE  2690                 IN      APTFLG                          ;READ APT PRESENT FLAG
   04 DB    0FDE               .BYTE   ^0333 , APTFLG&255      ;to register A
            0FE0  2691                 CMA                                     ;INVERT VALUE (HIGH=SET NOW)
      2F    0FE0               .BYTE   ^057
            0FE1  2692                 MOV     B,A                             ;STORE IN B REG
      47    0FE1               .BYTE   ^0100 ! <B*8> ! A
            0FE2  2693                 IN      REMOTE                          ;GET REMOTE FLAG
   06 DB    0FE2               .BYTE   ^0333 , REMOTE&255      ;to register A
            0FE4  2694                 CMA                                     ;INVERT VALUE
      2F    0FE4               .BYTE   ^057
            0FE5  2695                 ANA     B                               ;AND TWO FLAGS
      A0    0FE5               .BYTE   ^0240 ! B
            0FE6  2696                 ANI     1                               ;MASK ALL BUT BIT 0
      E6    0FF6               .BYTE   ^0346
```

```
     01  0FE7                 .BYTE   1
         0FE8  2697                   STA     APT                             ;SAVE APT PRESENT FLAG
     32  0FE8                 .BYTE   ^062
  0038'  0FE9                 .WORD   <APT-HEAD>
         0FEB  2698
         0FEB  2699                   CALL    CHECKSUM                        ;CALC CHECKSUM
     CD  0FEB                 .BYTE   ^0315
  1BE9'  0FEC                 .WORD   <CHECKSUM-HEAD>
         0FEE  2700
         0FEE  2701                   IFNEQ   NEWSUM,OLDSUM,1
     21  0FEE                 .BYTE   <H*8> ! 1
 03'BC'  0FEF                 .BYTE   <NEWSUM-HEAD>&255 , <<NEWSUM-HEAD>&^XFF00>/256
     11  0FF1                 .BYTE   <D*8> ! 1
 03'CF'  0FF2                 .BYTE   <OLDSUM-HEAD>&255 , <<OLDSUM-HEAD>&^XFF00>/256
  01 0E  0FF4                 .BYTE   <C*8> ! 6 , 1&255
     CD  0FF6                 .BYTE   ^0315
  00CF'  0FF7                 .WORD   <COMPARE-HEAD>
     CA  0FF9                 .BYTE   ^0312
  1001'  0FFA                 .WORD   <2039$-HEAD>
         0FFC  2702                   MVI     B,<^X27>
  27 06  0FFC                 .BYTE   <B*8> ! 6 , ^X27&255
         0FFE  2703                   CALL    ERROR_ROUTINE                   ;CHECKSUM ERROR IN MICMON
     CD  0FFE                 .BYTE   ^0315
  0C4A'  0FFF                 .WORD   <ERROR_ROUTINE-HEAD>
         1001  2704                   ENDIF
         1001        2039$:                                                   ;GENERATE LCL 2039 NAME
         1001  2705
         1001  2706                   CLEAR   CNT_PAR                         ;CLEAR PARITY ERROR COUNT
     AF  1001                 .BYTE   ^0250 ! A                     ;with A
     32  1002                 .BYTE   ^062
  0254'  1003                 .WORD   <CNT_PAR-HEAD>
         1005  2707
         1005  2708                   EI                                      ;ENABLE INTERUPTS
     FB  1005                 .BYTE   ^0373
         1006  2709
         1006  2710                   RET
     C9  1006                 .BYTE   ^0311
         1007  2711
         1007  2712
         1007  2713 ;*****************************************************************************
         1007  2714 ;
         1007  2715 ;   PRINTER
         1007  2716 ;   THIS ROUTINE PRINTS A STRING OF CHARS
         1007  2717 ;   INPUT CONDITIONS
         1007  2718 ;       H+L = POINTER TO THE STRING
         1007  2719 ;       C   = NUMBER OF CHARS IN THE STRING
         1007  2720 ;
         1007  2721 ;*****************************************************************************
         1007  2722
         1007  2723 PRINTER:         MOV     A,C                             ;LD A WITH CHAR COUNT
     79  1007                 .BYTE   ^0100 ! <A*8> ! C
         1008  2724                   CALL    SLVEC1                          ;CALL SEND LINE ROUTINE IN BOOT
     CD  1008                 .BYTE   ^0315
   4133  1009                 .WORD   <SLVEC1-HEAD>
         100B  2725                                                           ; BLOCK.
         100B  2726                   JMP     CHECK_CNTLC                     ;IF ^C TYPED, GO TO PARSER
     C3  100B                 .BYTE   ^0303
```

```
1073' 100C                  .WORD   <CHECK_CNTLC-HEAD>
      100E
      100E  ;*************************************************************************
      100E  ;
      100E  ;   PRINT_STRING_R
      100E  ;   THIS ROUTINE PRINTS A STRING OF CHARS WITH THE CHAR COUNT AS THE FIRST BYTE
      100E  ;   OF THE STRING TO THE TERMINAL IF APT IS NOT PRESENT.
      100E  ;
      100E  ;   INPUT CONDITIONS
      100E  ;         H+L = POINTER TO THE STRING BEGINNING WITH CHAR COUNT
      100E  ;
      100E  ;*************************************************************************
      100E
      100E  PRINT_STRING_R:
      100E                  CALL    SLVECT                  ;CALL SEND LINE ROUTINE IN BOOT
   CD 100E          .BYTE   ^0315
 412E 100F          .WORD   <SLVECT-HEAD>
      1011                                                  ; BLOCK, IF APT NOT PRESENT,
      1011                                                  ; THAT EXPECTS CHAR COUNT
      1011                                                  ; AS FIRST CHAR IN STRING
      1011                  JMP     CHECK_CNTLC             ;IF ^C TYPED, GO TO PARSER
   C3 1011          .BYTE   ^0303
1073' 1012          .WORD   <CHECK_CNTLC-HEAD>
      1014
      1014  ;*************************************************************************
      1014  ;
      1014  ;   PRINT_STRING_APT
      1014  ;   THIS ROUTINE PRINTS A STRING OF CHARS WITH THE CHAR COUNT AS THE FIRST BYTE
      1014  ;   OF THE STRING TO THE TERMINAL OR TO APT IF PRESENT.
      1014  ;
      1014  ;   INPUT CONDITIONS
      1014  ;         H+L = POINTER TO THE STRING BEGINNING WITH CHAR COUNT
      1014  ;
      1014  ;*************************************************************************
      1014
      1014  PRINT_STRING_APT:
      1014                  CALL    SLVECT                  ;CALL SEND LINE ROUTINE IN BOOT
   CD 1014          .BYTE   ^0315
 412E 1015          .WORD   <SLVECT-HEAD>
      1017                                                  ; BLOCK THAT EXPECTS CHAR COUNT
      1017                                                  ; AS FIRST CHAR IN STRING
      1017                  JMP     CHECK_CNTLC             ;IF ^C TYPED, GO TO PARSER
   C3 1017          .BYTE   ^0303
1073' 1018          .WORD   <CHECK_CNTLC-HEAD>
      101A
      101A
      101A  ;*************************************************************************
      101A  ;
      101A  ;   CRLF_R
      101A  ;   THIS ROUTINE PRINTS A RETURN AND LINE FEED (THE BOOT BLOCK PRINT LINE
      101A  ;   ROUTINE SUPPLIES THE LINE FEED).
      101A  ;
      101A  ;*************************************************************************
      101A
      101A  CRLF_R:         LXI     H,CRLF_A                ;POINT TO CR
   21 101A          .BYTE   <H*8> ! 1
02'5B' 101B         .BYTE   <CRLF_A-HEAD>&255 , <<CRLF_A-HEAD>&^XFF00>/256
```

```
           101D  2773                  CALL    PRINT_STRING_R              ;PRINT IT
       CD  101D               .BYTE    ^0315
    100E'  101E               .WORD    <PRINT_STRING_R-HEAD>
           1020  2774
           1020  2775                  RET
       C9  1020               .BYTE    ^0311
           1021  2776
           1021  2777 ;*****************************************************************************
           1021  2778 ;
           1021  2779 ;   SPACE_R
           1021  2780 ;   THIS ROUTINE PRINTS A SPACE
           1021  2781 ;
           1021  2782 ;*****************************************************************************
           1021  2783
           1021  2784 SPACE_R:         MVI     A,SPACE_A                   ;PRINT SPACE
    20 3E  1021               .BYTE    <A*8> ! 6 , SPACE_A&255
           1023  2785                  CALL    TYPE_CHAR
       CD  1023               .BYTE    ^0315
    1027'  1024               .WORD    <TYPE_CHAR-HEAD>
           1026  2786                  RET
       C9  1026               .BYTE    ^0311
           1027  2787
           1027  2788 ;*****************************************************************************
           1027  2789 ;
           1027  2790 ;   TYPE_CHAR
           1027  2791 ;   THIS ROUTINE LOADS THE ACCUMULATOR WITH AN ASCII CHARACTER AND CALLS THE
           1027  2792 ;   SEND CHAR ROUTINE IN THE BOOT BLOCK.
           1027  2793 ;
           1027  2794 ;*****************************************************************************
           1027  2795
           1027  2796 TYPE_CHAR:
           1027  2797 PRINT_R:         CALL    SCVECT                      ;CALL SEND CHAR ROUTINE IN
       CD  1027               .BYTE    ^0315
     4138  1028               .WORD    <SCVECT-HEAD>
           102A  2798                                                      ; BOOT BLOCK
           102A  2799
           102A  2800                  CALL    CHECK_CNTLC                 ;IF ^C TYPED, GO TO PARSER
       CD  102A               .BYTE    ^0315
    1073'  102B               .WORD    <CHECK_CNTLC-HEAD>
           102D  2801                  RET
       C9  102D               .BYTE    ^0311
           102E  2802
           102E  2803
           102E  2804 ;*****************************************************************************
           102E  2805 ;
           102E  2806 ;   INPUT_LINE
           102E  2807 ;
           102E  2808 ;   THIS ROUTINE INPUTS A LINE OF DATA FROM EITHER THE CONSOLE UART OR THE
           102E  2809 ;   APT-RD UART AND PUTS THEM INTO BUFFERS.
           102E  2810 ;
           102E  2811 ;                          IF APT IS PRESENT THE APT-RD PORT WILL RECEIVE
           102E  2812 ;                  A PROMPT AND WILL BE MONITORED.
           102E  2813 ;
           102E  2814 ;                          IF APT IS NOT PRESENT ONLY THE TERMINAL PORT
           102E  2815 ;                  WILL RECEIVE A PROMPT AND BE MONITORED.  THE STANDARD
           102E  2816 ;                  CONSOLE AND MICRO MONITOR WILL EXPECT THE TU58 TO BE PRESENT
           102E  2817 ;                  IF ANY COMMAND REQUIRING IT IS USED.  IN THE CASE OF DUMP
```

```
               102E  2818 ;                      MODE ISSUING COMMANDS REQUIRING THE TU58 ARE ILLEGAL.
               102E  2819 ;
               102E  2820 ;*******************************************************************************
               102E  2821
               102E  2822 INPUT_LINE:            CLEAR   ERROR
          AF   102E                    .BYTE     ^0250 ! A                    ;with A
          32   102F                    .BYTE     ^062
       02E2'   1030                    .WORD     <ERROR-HEAD>
               1032  2823
               1032  2824                        ZERO    TTBUF,80                   ;ZERO BUFFER AREA
          21   1032                    .BYTE     <H*8> ! 1
     08'D1'    1033                    .BYTE     <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
       50 0E   1035                    .BYTE     <C*8> ! 6 , 80&255
          AF   1037                    .BYTE     ^0250 ! A                    ;with A
               1038         2040$:               MOV     M,A
          77   1038                    .BYTE     ^0100 ! <M*8> ! A
          23   1039                    .BYTE     <H*8> ! 3
          0D   103A                    .BYTE     ^05 ! <8*C>
          C2   103B                    .BYTE     ^0302
       1038'   103C                    .WORD     <2040$-HEAD>
               103E  2825                        LXI     H,TTBUF_CNT                ;INIT TTY BUFFER POINTER
          21   103E                    .BYTE     <H*8> ! 1
     08'D0'    103F                    .BYTE     <TTBUF_CNT-HEAD>&255 , <<TTBUF_CNT-HEAD>&^XFF00>/256
               1041  2826                        CALL    GLVECT                     ;CALL GET LINE ROUTINE IN BOOT
          CD   1041                    .BYTE     ^0315
        4123   1042                    .WORD     <GLVECT-HEAD>
               1044  2827                                                           ; BLOCK
               1044  2828 1$:                    IF      CNTLC_TYPED
          3A   1044                    .BYTE     ^072
       0039'   1045                    .WORD     <CNTLC_TYPED-HEAD>
          0F   1047                    .BYTE     ^017
          D2   1048                    .BYTE     ^0322
       1055'   1049                    .WORD     <2041$-HEAD>
               104B  2829                        CLEAR   CNTLC_TYPED                ;CLEAR FLAG
          AF   104B                    .BYTE     ^0250 ! A                  ;with A
          32   104C                    .BYTE     ^062
       0039'   104D                    .WORD     <CNTLC_TYPED-HEAD>
               104F  2830                        CALL    PRINT_PROMPT               ;PROMPT FOR NEW INPUT
          CD   104F                    .BYTE     ^0315
       0FD6'   1050                    .WORD     <PRINT_PROMPT-HEAD>
               1052  2831                        JMP     INPUT_LINE
          C3   1052                    .BYTE     ^0303
       102E'   1053                    .WORD     <INPUT_LINE-HEAD>
               1055  2832                        ENDIF
               1055         2041$:                                                  ;GENERATE LCL 2041 NAME
               1055  2833
               1055  2834                        LXI     H,TTBUF                    ;INIT TTY BUFFER POINTER
          21   1055                    .BYTE     <H*8> ! 1
     08'D1'    1056                    .BYTE     <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
               1058  2835                        SHLD    TTBUF_PNT
          22   1058                    .BYTE     ^042
       044D'   1059                    .WORD     <TTBUF_PNT-HEAD>
               105B  2836
               105B  2837                        RET
          C9   105B                    .BYTE     ^0311
               105C  2838
               105C  2839 ;*******************************************************************************
        105C  ;
        105C  ;  INPUT_CHAR_IF
        105C  ;  THIS ROUTINE INPUTS A CHAR FROM THE APT-RD PORT
        105C  ;
        105C  ;  OUTPUT CONDTIONS
        105C  ;       ACCUMULATOR  = CHAR THAT WAS INPUT
        105C  ;
        105C  ;************************************************************************
        105C
        105C  INPUT_CHAR_IF:  CALL    GSVECT                      ;CALL GET SILO ROUTINE IN
     CD 105C          .BYTE   ^0315
   4145 105D          .WORD   <GSVECT-HEAD>
        105F                                                      ; BOOT BLOCK.  IF CHAR FOUND,
        105F                                                      ; CARRY IS SET AND CHAR IS IN
        105F                                                      ; ACCUMULATOR
        105F
        105F                  JNC     INPUT_CHAR_IF               ;LOOP UNTIL CHAR RECEIVED
     D2 105F          .BYTE   ^0322
  105C' 1060          .WORD   <INPUT_CHAR_IF-HEAD>
        1062
        1062                  RET
     C9 1062          .BYTE   ^0311
        1063
        1063  ;************************************************************************
        1063  ;
        1063  ;  CNTLC_VEC
        1063  ;  THIS ROUTINE IS ENTERED AFTER CALLING THE BOOT BLOCK GET CHAR OR GET LINE
        1063  ;  ROUTINE IF A ^C WAS TYPED.  IT WILL SET A FLAG, RESTORE THE STACK POINTER,
        1063  ;  AND RETURN TO THE CALLING ROUTINE.
        1063  ;
        1063  ;************************************************************************
        1063
        1063  CNTLC_VEC:      SET     CNTLC_TYPED                 ;SET FLAG INDICATING ^C
     AF 1063          .BYTE   ^0250 ! A               ;with A
     3C 1064          .BYTE   ^04 ! <8*A>
     32 1065          .BYTE   ^062
  0039' 1066          .WORD   <CNTLC_TYPED-HEAD>
        1068                  LHLD    SPBUFF                      ;HL GETS OLD SP
     2A 1068          .BYTE   ^052
   4086 1069          .WORD   <SPBUFF-HEAD>
        106B                  SPHL                                ;RESTORE SP
     F9 106B          .BYTE   ^0371
        106C                  STC                                 ;SET CARRY FOR INPUT_CHAR_IF
     37 106C          .BYTE   ^067
        106D                  MVI     A,<^X3>                     ;PUT HEX FOR ^C IN A
  03 3E 106D          .BYTE   <A*8> ! 6 , ^X3&255
        106F                  RET                                 ;RETURN WILL NOW WORK
     C9 106F          .BYTE   ^0311
        1070
        1070  ;************************************************************************
        1070  ;
        1070  ;  CNTLP_VEC
        1070  ;  THIS ROUTINE IS ENTERED AFTER CALLING THE BOOT BLOCK GET CHAR OR GET LINE
        1070  ;  ROUTINE IF A ^P WAS TYPED.  IT WILL CAUSE CRD TO ABORT AND RETURN TO THE
        1070  ;  CONSOLE.
        1070  ;
        1070  ;************************************************************************
```

```
             1070  2882
             1070  2883 CNTLP_VEC:
             1070  2884                     JMP      MENU                          ;EITHER EXIT OR RESTART
        C3   1070              .BYTE        ^0303
     1616'   1071              .WORD        <MENU-HEAD>
             1073  2885
             1073  2886
             1073  2887 ;****************************************************************************
             1073  2888 ;
             1073  2889 ;   CHECK_CNTLC
             1073  2890 ;
             1073  2891 ;   THIS ROUTINE CHECKS THE CNTLC_TYPED FLAG TO SEE IF A CNTLC HAS BEEN
             1073  2892 ;   DETECTED.  IF SO, IT CALLS THE SET_FOR_CONT_R ROUTINE.
             1073  2893 ;
             1073  2894 ;****************************************************************************
             1073  2895
             1073  2896 CHECK_CNTLC:    LDA      CNTLC_TYPED                   ;GET FLAG
        3A   1073              .BYTE        ^072
     0039'   1074              .WORD        <CNTLC_TYPED-HEAD>
             1076  2897                     ORA      A                             ;SET CONDITION CODES
        B7   1076              .BYTE        ^0260 ! A
             1077  2898                     CNZ      SET_FOR_CONT_R                ;CALL SET FOR CONT IF ^C SET
        C4   1077              .BYTE        ^0304
     107B'   1078              .WORD        <SET_FOR_CONT_R-HEAD>
             107A  2899                     RET                                    ;ELSE RETURN
        C9   107A              .BYTE        ^0311
             107B  2900
             107B  2901 ;****************************************************************************
             107B  2902 ;
             107B  2903 ;   SET_FOR_CONT_R:
             107B  2904 ;
             107B  2905 ;   THIS ROUTINE SETS UP FOR A CONTINUE COMMAND TO BE EXECUTED IF IT IS
             107B  2906 ;   ASKED FOR
             107B  2907 ;
             107B  2908 ;****************************************************************************
             107B  2909
             107B  2910 SET_FOR_CONT_R: CLEAR    CNTLC_TYPED
        AF   107B              .BYTE        ^0250 ! A                   ;with A
        32   107C              .BYTE        ^062
     0039'   107D              .WORD        <CNTLC_TYPED-HEAD>
             107F  2911                     CLEAR    NO_SAVE_UPC_CSR               ;CLEAR FLAG
        AF   107F              .BYTE        ^0250 ! A                   ;with A
        32   1080              .BYTE        ^062
     03C0'   1081              .WORD        <NO_SAVE_UPC_CSR-HEAD>
             1083  2912
             1083  2913                     LDA      EXECUTE                       ;SAVE EXECUTION FLAGS
        3A   1083              .BYTE        ^072
     02EA'   1084              .WORD        <EXECUTE-HEAD>
             1086  2914                     STA      C_EXECUTE
        32   1086              .BYTE        ^062
     0250'   1087              .WORD        <C_EXECUTE-HEAD>
             1089  2915                     LDA      RUNNING
        3A   1089              .BYTE        ^072
     0403'   108A              .WORD        <RUNNING-HEAD>
             108C  2916                     STA      C_RUNNING
        32   108C              .BYTE        ^062
     0251'   108D              .WORD        <C_RUNNING-HEAD>
```

```
          108F  2917
          108F  2918                      IF      RUNNING
      3A  108F                    .BYTE   ^072
   0403'  1090                    .WORD   <RUNNING-HEAD>
      0F  1092                    .BYTE   ^017
      D2  1093                    .BYTE   ^0322
   109E'  1094                    .WORD   <2042$-HEAD>
          1096  2919                      CALL    STOP_CPU                       ;HALT CPU
      CD  1096                    .BYTE   ^0315
   10C9'  1097                    .WORD   <STOP_CPU-HEAD>
          1099  2920                      SET     MICRO_STEP                     ;SET FLAG TO PRINT UPC-1
      AF  1099                    .BYTE   ^0250 ! A                   ;with A
      3C  109A                    .BYTE   ^04 ! <8*A>
      32  109B                    .BYTE   ^062
   038A'  109C                    .WORD   <MICRO_STEP-HEAD>
          109E  2921                      ENDIF
          109E          2042$:                                                   ;GENERATE LCL 2042 NAME
          109E  2922
          109E  2923                      CLEAR   MICRO_STEP                     ;CLEAR MICRO STEP MODE
      AF  109E                    .BYTE   ^0250 ! A                   ;with A
      32  109F                    .BYTE   ^062
   038A'  10A0                    .WORD   <MICRO_STEP-HEAD>
          10A2  2924                      LHLD    SAVED_UPC                      ;SAVE CSR AND UPC FOR CONT
      2A  10A2                    .BYTE   ^052
   00C4'  10A3                    .WORD   <SAVED_UPC-HEAD>
          10A5  2925                      SHLD    CONT_SAVE_UPC
      22  10A5                    .BYTE   ^042
   00C8'  10A6                    .WORD   <CONT_SAVE_UPC-HEAD>
          10A8  2926
          10A8  2927                      LXI     H,SAVED_CSR
      21  10A8                    .BYTE   <H*8> ! 1
  00'BB'  10A9                    .BYTE   <SAVED_CSR-HEAD>&255 , <<SAVED_CSR-HEAD>&^XFF00>/256
          10AB  2928                      LXI     D,CONT_SAVE_CSR
      11  10AB                    .BYTE   <D*8> ! 1
  00'BE'  10AC                    .BYTE   <CONT_SAVE_CSR-HEAD>&255 , <<CONT_SAVE_CSR-HEAD>&^XFF00>/256
          10AE  2929                      CALL    MOVER_3_R
      CD  10AE                    .BYTE   ^0315
   0F5F'  10AF                    .WORD   <MOVER_3_R-HEAD>
          10B1  2930
          10B1  2931                      CLEAR   EXECUTE                        ;CLEAR EXECUTION FLAG TO ENTER
      AF  10B1                    .BYTE   ^0250 ! A                   ;with A
      32  10B2                    .BYTE   ^062
   02EA'  10B3                    .WORD   <EXECUTE-HEAD>
          10B5  2932                                                             ; PARSER
          10B5  2933
          10B5  2934                      IFN     CONSOLE_TEST                   ;IF 8085 TEST IS NOT RUNNING
      3A  10B5                    .BYTE   ^072
   0255'  10B6                    .WORD   <CONSOLE_TEST-HEAD>
      0F  10B8                    .BYTE   ^017
      DA  10B9                    .BYTE   ^0332
   10C4'  10BA                    .WORD   <2043$-HEAD>
          10BC  2935                      SET     CONTINUE                       ;CONTINUE ALWAYS LEGAL FOR WCS
      AF  10BC                    .BYTE   ^0250 ! A                   ;with A
      3C  10BD                    .BYTE   ^04 ! <8*A>
      32  10BE                    .BYTE   ^062
   003A'  10BF                    .WORD   <CONTINUE-HEAD>
          10C1  2936                                                             ; TESTS IF THIS ROUTINE CALLED
```

```
         10C1  2937                   ELSE
     C3  10C1             .BYTE       ^0303
  10C6'  10C2             .WORD       <2044$-HEAD>
         10C4        2043$:                                            ;GENERATE LOCAL SYMBOL NAME
         10C4  2938                   OUT      CLRLIT                  ;IF 8085 TEST, TURN OFF RUN
  3C D3  10C4             .BYTE       ^0323 , CLRLIT&255      ;register A
         10C6  2939                                                    ; LIGHT
         10C6  2940                   ENDIF
         10C6        2044$:                                            ;GENERATE LCL 2044 NAME
         10C6  2941
         10C6  2942                   JMP      MENU
     C3  10C6             .BYTE       ^0303
  1616'  10C7             .WORD       <MENU-HEAD>
         10C9  2943
         10C9  2944 ;*********************************************************************
         10C9  2945 ;
         10C9  2946 ;  STOP_CPU
         10C9  2947 ;  THIS ROUTINE STOPS THE CPU. IT SAVES THE UPC AND CSR SO THAT
         10C9  2948 ;  EXECUTION MAY RESUME AT THE NEXT INSTRUCTION
         10C9  2949 ;
         10C9  2950 ;*********************************************************************
         10C9  2951
         10C9  2952 STOP_CPU:            CLEAR    RUNNING
     AF  10C9             .BYTE       ^0250 ! A               ;with A
     32  10CA             .BYTE       ^062
  0403'  10CB             .WORD       <RUNNING-HEAD>
         10CD  2953                   OUT      CLRLIT                  ;CLEAR RUNLITE
  3C D3  10CD             .BYTE       ^0323 , CLRLIT&255      ;register A
         10CF  2954
         10CF  2955                   OUT      CLRCLK                  ;STOP CPU CLOCK
  20 D3  10CF             .BYTE       ^0323 , CLRCLK&255      ;register A
         10D1  2956                   OUT      DISMEM                  ;DISABLE MEM REF
  A7 D3  10D1             .BYTE       ^0323 , DISMEM&255      ;register A
         10D3  2957                   OUT      DISPAR                  ;DISABLE PARITY
  A1 D3  10D3             .BYTE       ^0323 , DISPAR&255      ;register A
         10D5  2958
         10D5  2959                   IFN      NO_SAVE_UPC_CSR         ;DON'T SAVE UPC AND CSR
     3A  10D5             .BYTE       ^072
  03C0'  10D6             .WORD       <NO_SAVE_UPC_CSR-HEAD>
     0F  10D8             .BYTE       ^017
     DA  10D9             .BYTE       ^0332
  10F7'  10DA             .WORD       <2045$-HEAD>
         10DC  2960                                                    ; IF FLAG SET
         10DC  2961                   CALL     LOAD_UPC_R              ;GET UPC AND SAVE UPC
     CD  10DC             .BYTE       ^0315
  0F19'  10DD             .WORD       <LOAD_UPC_R-HEAD>
         10DF  2962                   LHLD     UPC_VALUE
     2A  10DF             .BYTE       ^052
  00C2'  10E0             .WORD       <UPC_VALUE-HEAD>
         10E2  2963                   SHLD     SAVED_UPC
     22  10E2             .BYTE       ^042
  00C4'  10E3             .WORD       <SAVED_UPC-HEAD>
         10E5  2964                   CALL     LOAD_UPC_R              ;RETURN VALUE
     CD  10E5             .BYTE       ^0315
  0F19'  10E6             .WORD       <LOAD_UPC_R-HEAD>
         10E8  2965
         10F8  2966                   CALL     LOAD_CSR_R              ;GET CSR AND SAVE CSR
```

```
      CD  10E8                    .BYTE    ^0315
   0EE7'  10E9                    .WORD    <LOAD_CSR_R-HEAD>
          10EB   2967                      LXI     H,CSR_VALUE
      21  10EB                    .BYTE    <H*8> ! 1
  00'B8'  10EC                    .BYTE    <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
          10EE   2968                      LXI     D,SAVED_CSR
      11  10EE                    .BYTE    <D*8> ! 1
  00'BB'  10EF                    .BYTE    <SAVED_CSR-HEAD>&255 , <<SAVED_CSR-HEAD>&^XFF00>/256
          10F1   2969                      CALL    MOVER_3_R
      CD  10F1                    .BYTE    ^0315
   0F5F'  10F2                    .WORD    <MOVER_3_R-HEAD>
          10F4   2970                      CALL    LOAD_CSR_R                  ;RETURN VALUE
      CD  10F4                    .BYTE    ^0315
   0EE7'  10F5                    .WORD    <LOAD_CSR_R-HEAD>
          10F7   2971
          10F7   2972                      ENDIF
          10F7         2045$:                                                  ;GENERATE LCL 2045 NAME
          10F7   2973
          10F7   2974                      CLEAR   NO_SAVE_UPC_CSR             ;CLEAR FLAG
      AF  10F7                    .BYTE    ^0250 ! A                ;with A
      32  10F8                    .BYTE    ^062
   03C0'  10F9                    .WORD    <NO_SAVE_UPC_CSR-HEAD>
          10FB   2975                      CALL    CLEAR_CPU_ATT_R
      CD  10FB                    .BYTE    ^0315
   1A61'  10FC                    .WORD    <CLEAR_CPU_ATT_R-HEAD>
          10FE   2976
          10FE   2977                      RET
      C9  10FE                    .BYTE    ^0311
          10FF   2978
          10FF   2979
          10FF   2980  ;*********************************************************************
          10FF   2981  ;
          10FF   2982  ;    START_CPU
          10FF   2983  ;    THIS ROUTINE STARTS THE CPU AT THE ADDRESS GIVEN BY THE RAM
          10FF   2984  ;    LOCATION STARTING_ADD
          10FF   2985  ;    IF MICRO STEP IS SET THE CPU IS SET UP BUT NOT STARTED
          10FF   2986  ;
          10FF   2987  ;*********************************************************************
          10FF   2988
          10FF   2989  START_CPU:          LHLD    STARTING_UPC
      2A  10FF                    .BYTE    ^052
   0407'  1100                    .WORD    <STARTING_UPC-HEAD>
          1102   2990                      SHLD    UPC_VALUE                   ;MOVE STARTING ADDRESS
      22  1102                    .BYTE    ^042
   00C2'  1103                    .WORD    <UPC_VALUE-HEAD>
          1105   2991
          1105   2992                      CALL    LOAD_UPC_R
      CD  1105                    .BYTE    ^0315
   0F19'  1106                    .WORD    <LOAD_UPC_R-HEAD>
          1108   2993                      CALL    NOP_CSR_R
      CD  1108                    .BYTE    ^0315
   0EC4'  1109                    .WORD    <NOP_CSR_R-HEAD>
          110B   2994
          110B   2995                      JMP     START_CPU_COM               ;GO TO ROUTINE COMMON TO
      C3  110B                    .BYTE    ^0303
   1123'  110C                    .WORD    <START_CPU_COM-HEAD>
          110E   2996                                                          ; START OR RESTART
```

```
             110E  2997
             110E  2998
             110E  2999 ;*************************************************************************
             110E  3000 ;
             110E  3001 ;  THIS SUBROUTINE IS USED TO RESTART THE CPU AND IT RESTORES THE
             110E  3002 ;  CSR AND UPC.  IF MICRO STEP IS SET THE CPU IS SET UP BUT NOT STARTED
             110E  3003 ;
             110E  3004 ;*************************************************************************
             110E  3005
             110E  3006 RESTART_CPU:      LHLD    SAVED_UPC                    ;RESTORE UPC
        2A   110E                .BYTE    ^052
     00C4'   110F                .WORD    <SAVED_UPC-HEAD>
             1111  3007                   SHLD    UPC_VALUE
        22   1111                .BYTE    ^042
     00C2'   1112                .WORD    <UPC_VALUE-HEAD>
             1114  3008
             1114  3009                   CALL    LOAD_UPC_R
        CD   1114                .BYTE    ^0315
     0F19'   1115                .WORD    <LOAD_UPC_R-HEAD>
             1117  3010                   LXI     H,SAVED_CSR                  ;LOAD CSR
        21   1117                .BYTE    <H*8> ! 1
    00'BB'   1118                .BYTE    <SAVED_CSR-HEAD>&255 , <<SAVED_CSR-HEAD>&^XFF00>/256
             111A  3011                   LXI     D,CSR_VALUE
        11   111A                .BYTE    <D*8> ! 1
    00'B8'   111B                .BYTE    <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
             111D  3012                   CALL    MOVER_3_R
        CD   111D                .BYTE    ^0315
     0F5F'   111E                .WORD    <MOVER_3_R-HEAD>
             1120  3013                   CALL    LOAD_CSR_R
        CD   1120                .BYTE    ^0315
     0EE7'   1121                .WORD    <LOAD_CSR_R-HEAD>
             1123  3014
             1123  3015 START_CPU_COM:
             1123  3016                   IF      PAR_ON
        3A   1123                .BYTE    ^072
     03D6'   1124                .WORD    <PAR_ON-HEAD>
        0F   1126                .BYTE    ^017
        D2   1127                .BYTE    ^0322
     112C'   1128                .WORD    <2046$-HEAD>
             112A  3017                   OUT     ENBPAR                       ;ENABLE PARITY
     A0 D3   112A                .BYTE    ^0323 , ENBPAR&255        ;register A
             112C  3018                   ENDIF
             112C       2046$:                                                 ;GENERATE LCL 2046 NAME
             112C  3019
             112C  3020                   IF      MEM_REQ
        3A   112C                .BYTE    ^072
     0354'   112D                .WORD    <MEM_REQ-HEAD>
        0F   112F                .BYTE    ^017
        D2   1130                .BYTE    ^0322
     1135'   1131                .WORD    <2047$-HEAD>
             1133  3021                   OUT     ENBMEM                       ;ENABLE MEM REF
     A6 D3   1133                .BYTE    ^0323 , ENBMEM&255        ;register A
             1135  3022                   ENDIF
             1135       2047$:                                                 ;GENERATE LCL 2047 NAME
             1135  3023
             1135  3024                   IFN     MICRO_STEP
        3A   1135                .BYTE    ^072
```

```
   038A' 1136                 .WORD    <MICRO_STEP-HEAD>
      0F 1138                 .BYTE    ^017
      DA 1139                 .BYTE    ^0332
   113E' 113A                 .WORD    <2048$-HEAD>
         113C   3025                   OUT      SETCLK
   21 D3 113C                 .BYTE    ^0323 , SETCLK&255       ;register A
         113E   3026                   ENDIF
         113E        2048$:                                          ;GENERATE LCL 2048 NAME
         113E   3027
         113E   3028                   SET      RUNNING
      AF 113E                 .BYTE    ^0250 ! A                ;with A
      3C 113F                 .BYTE    ^04 ! <8*A>
      32 1140                 .BYTE    ^062
   0403' 1141                 .WORD    <RUNNING-HEAD>
         1143   3029                   OUT      SETLIT                   ;SET RUN LITE
   3D D3 1143                 .BYTE    ^0323 , SETLIT&255       ;register A
         1145   3030
         1145   3031                   RET
      C9 1145                 .BYTE    ^0311
         1146   3032
         1146   3033
         1146   3034 ;*********************************************************************************
         1146   3035 ;
         1146   3036 ;  WRITE_LS_R
         1146   3037 ;  THIS RUTINE WRITES A 32 BIT LS VALUE
         1146   3038 ;  INPUT CONDITIONS:
         1146   3039 ;         AC = LS ADDRESS THAT IS TO BE WRITTEN
         1146   3040 ;         DATA0 THRU DATA3 CONTAIN THE 32 BITS OF DATA TO BE WRITTEN
         1146   3041 ;
         1146   3042 ;*********************************************************************************
         1146   3043
         1146   3044 WRITE_LS_R:       STA      XD_ADDRS                 ;SAVE ADDRESS TO BE WRITTEN
      32 1146                 .BYTE    ^062
   0071' 1147                 .WORD    <XD_ADDRS-HEAD>
         1149   3045
         1149   3046                   LXI      H,S_WRITE_LS             ;RESET MOVE INSTRUCTION
      21 1149                 .BYTE    <H*8> ! 1
 06'72'  114A                 .BYTE    <S_WRITE_LS-HEAD>&255 , <<S_WRITE_LS-HEAD>&^XFF00>/256
         114C   3047                   LXI      D,X_WRITE_LS+1
      11 114C                 .BYTE    <D*8> ! 1
 06'6F'  114D                 .BYTE    <X_WRITE_LS+1-HEAD>&255 , <<X_WRITE_LS+1-HEAD>&^XFF00>/256
         114F   3048                   CALL     MOVER_3_R
      CD 114F                 .BYTE    ^0315
   0F5F' 1150                 .WORD    <MOVER_3_R-HEAD>
         1152   3049
         1152   3050                   LXI      H,X_WRITE_LS+1           ;MODIFY MOVE INSTRUCTION
      21 1152                 .BYTE    <H*8> ! 1
 06'6F'  1153                 .BYTE    <X_WRITE_LS+1-HEAD>&255 , <<X_WRITE_LS+1-HEAD>&^XFF00>/256
         1155   3051                   CALL     MAKE_XD_R
      CD 1155                 .BYTE    ^0315
   1183' 1156                 .WORD    <MAKE_XD_R-HEAD>
         1158   3052
         1158   3053                   CALL     WRITE_DATA_32_R          ;WRITE THE DATA TO 2901
      CD 1158                 .BYTE    ^0315
   11D2' 1159                 .WORD    <WRITE_DATA_32_R-HEAD>
         115B   3054
         115B   3055                   LXI      H,X_WRITE_LS             ;PERFORM THE WRITE
```

```
     21  115B               .BYTE   <H*8> ! 1
 06'6E'  115C               .BYTE   <X_WRITE_LS-HEAD>&255 , <<X_WRITE_LS-HEAD>&^XFF00>/256
         115E   3056                CALL    PERFORM_CSR_R
     CD  115E               .BYTE   ^0315
  12F2'  115F               .WORD   <PERFORM_CSR_R-HEAD>
         1161   3057
         1161   3058                CALL    GCVECT                          ;SEE IF INPUT FOR SILO
     CD  1161               .BYTE   ^0315
   4129  1162               .WORD   <GCVECT-HEAD>
         1164   3059                RET
     C9  1164               .BYTE   ^0311
         1165   3060
         1165   3061 ;*************************************************************************************
         1165   3062 ;
         1165   3063 ;  READ_LS_R
         1165   3064 ;  THIS ROUTINE READS A 32 BIT LS VALUE
         1165   3065 ;  INPUT CONDITIONS:
         1165   3066 ;       AC = LS ADDRESS THAT IS TO BE READ
         1165   3067 ;  OUTPUT CONDTIONS:
         1165   3068 ;       DATA0 THRU DATA3 CONTAIN THE 32 BITS READ
         1165   3069 ;
         1165   3070 ;*************************************************************************************
         1165   3071
         1165   3072 READ_LS_7:         MVI     A,LS_7                          ;LS ADDRESS 7
  07 3E  1165               .BYTE   <A*8> ! 6 , LS_7&255
         1167   3073
         1167   3074 READ_LS_R:         STA     XD_ADDRS                        ;SAVE ADDRESS TO BE READ
     32  1167               .BYTE   ^062
  0071'  1168               .WORD   <XD_ADDRS-HEAD>
         116A   3075
         116A   3076                LXI     H,S_READ_LS                     ;RESET MOVE INSTRUCTION
     21  116A               .BYTE   <H*8> ! 1
 06'67'  116B               .BYTE   <S_READ_LS-HEAD>&255 , <<S_READ_LS-HEAD>&^XFF00>/256
         116D   3077                LXI     D,X_READ_LS+1
     11  116D               .BYTE   <D*8> ! 1
 06'64'  116E               .BYTE   <X_READ_LS+1-HEAD>&255 , <<X_READ_LS+1-HEAD>&^XFF00>/256
         1170   3078                CALL    MOVER_3_R
     CD  1170               .BYTE   ^0315
  0F5F'  1171               .WORD   <MOVER_3_R-HEAD>
         1173   3079
         1173   3080                LXI     H,X_READ_LS+1                   ;AND MODIFY MOVE TO DO IT
     21  1173               .BYTE   <H*8> ! 1
 06'64'  1174               .BYTE   <X_READ_LS+1-HEAD>&255 , <<X_READ_LS+1-HEAD>&^XFF00>/256
         1176   3081                CALL    MAKE_XD_R
     CD  1176               .BYTE   ^0315
  1183'  1177               .WORD   <MAKE_XD_R-HEAD>
         1179   3082
         1179   3083                LXI     H,X_READ_LS                     ;PERFORM THE READ
     21  1179               .BYTE   <H*8> ! 1
 06'63'  117A               .BYTE   <X_READ_LS-HEAD>&255 , <<X_READ_LS-HEAD>&^XFF00>/256
         117C   3084                CALL    PERFORM_CSR_R
     CD  117C               .BYTE   ^0315
  12F2'  117D               .WORD   <PERFORM_CSR_R-HEAD>
         117F   3085                CALL    READ_DATA_32_R
     CD  117F               .BYTE   ^0315
  11B4'  1180               .WORD   <READ_DATA_32_R-HEAD>
         1182   3086
```

```
               1182  3087                         RET
          C9   1182                 .BYTE         ^0311
               1183  3088
               1183  3089
               1183  3090 ;*************************************************************************
               1183  3091 ;
               1183  3092 ;  MAKE_XD_R
               1183  3093 ;  THIS ROUTINE MAKES AN INSTRUCTION HAVE THE PROPER XD ADDRESS FIELD
               1183  3094 ;
               1183  3095 ;  INPUT CONDITIONS:
               1183  3096 ;       XD_ADDRS = DATA TO BE INSERTED INTO THE XD ADDRESS FIELD (BITS 9-16)
               1183  3097 ;       H + L    = POINTS TO THE 3 BYTE INSTRUCTION TO MODIFY
               1183  3098 ;
               1183  3099 ;*************************************************************************
               1183  3100
               1183  3101 MAKE_XD_R:        LDA     XD_ADDRS                 ;PUT BIT 7 OF XD_ADDRS
          3A   1183                 .BYTE         ^072
       0071'   1184                 .WORD         <XD_ADDRS-HEAD>
                                                                           ;INTO BIT 16 OF INSTRUCTION
               1186  3102                         RAL
          17   1186                 .BYTE         ^027
               1187  3103                         MVI     A,0
       00 3E   1187                 .BYTE         <A*8> ! 6 , 0&255
               1189  3104                         RAL
          17   1189                 .BYTE         ^027
               118A  3105                         ORA     M
          B6   118A                 .BYTE         ^0260 ! M
               118B  3106                         MOV     M,A
          77   118B                 .BYTE         ^0100 ! <M*8> ! A
               118C  3107                         INX     H
          23   118C                 .BYTE         <H*8> ! 3
               118D  3108
               118D  3109                         LDA     XD_ADDRS                 ;PUT BITS 0 - 6 INTO BITS
          3A   118D                 .BYTE         ^072
       0071'   118E                 .WORD         <XD_ADDRS-HEAD>
               1190  3110                                                  ;15 - 9 OF INSTRUCTION
               1190  3111                         ORA     A                        ;CLEAR CARRY
          B7   1190                 .BYTE         ^0260 ! A
               1191  3112                         RAL
          17   1191                 .BYTE         ^027
               1192  3113                         ORA     M
          B6   1192                 .BYTE         ^0260 ! M
               1193  3114                         MOV     M,A
          77   1193                 .BYTE         ^0100 ! <M*8> ! A
               1194  3115
               1194  3116                         RET
          C9   1194                 .BYTE         ^0311
               1195  3117
               1195  3118
               1195  3119 ;*************************************************************************
               1195  3120 ;
               1195  3121 ;  MAKE_B
               1195  3122 ;  THIS ROUTINE MAKES AN INSTRUCTION HAVE THE PROPER B ADDRESS FIELD
               1195  3123 ;
               1195  3124 ;  INPUT CONDITIONS:
               1195  3125 ;       B_ADDRS   = DATA TO BE INSERTED INTO THE B ADDRESS FIELD (BITS 7-8)
               1195  3126 ;       H + L     = POINTS TO THE 3 BYTE INSTRUCTION TO MODIFY
               1195  3127 ;
```

```
                1195  3128 ;****************************************************************************
                1195  3129
                1195  3130 MAKE_B:              INX     H                                   ;MOVE TO SECOND BYTE
           23   1195                  .BYTE     <H*8> ! 3
                1196  3131
                1196  3132                      LDA     B_ADDRS                             ;PUT BIT 2 OF B_ADDRS INTO
           3A   1196                  .BYTE     ^072
        0240'   1197                  .WORD     <B_ADDRS-HEAD>
                1199  3133                      RAR                                         ;BIT 8 OF THE INSTRUCTION
           1F   1199                  .BYTE     ^037
                119A  3134                      RAR
           1F   119A                  .BYTE     ^037
                119B  3135                      MVI     A,0
        00 3E   119B                  .BYTE     <A*8> ! 6 , 0&255
                119D  3136                      RAL
           17   119D                  .BYTE     ^027
                119E  3137                      ORA     M
           B6   119E                  .BYTE     ^0260 ! M
                119F  3138                      MOV     M,A
           77   119F                  .BYTE     ^0100 ! <M*8> ! A
                11A0  3139                      INX     H
           23   11A0                  .BYTE     <H*8> ! 3
                11A1  3140
                11A1  3141                      LDA     B_ADDRS                             ;PUT BIT 1 OF B_ADDRS INTO
           3A   11A1                  .BYTE     ^072
        0240'   11A2                  .WORD     <B_ADDRS-HEAD>                              ;BIT 7 OF THE INSTRUCTION
                11A4  3142                      RAR
           1F   11A4                  .BYTE     ^037
                11A5  3143                      MVI     A,0
        00 3E   11A5                  .BYTE     <A*8> ! 6 , 0&255
                11A7  3144                      RAR
           1F   11A7                  .BYTE     ^037
                11A8  3145                      ORA     M
           B6   11A8                  .BYTE     ^0260 ! M
                11A9  3146                      MOV     M,A
           77   11A9                  .BYTE     ^0100 ! <M*8> ! A
                11AA  3147
                11AA  3148                      RET
           C9   11AA                  .BYTE     ^0311
                11AB  3149
                11AB  3150
                11AB  3151 ;****************************************************************************
                11AB  3152 ;
                11AB  3153 ;  MAKE_A
                11AB  3154 ;  THIS ROUTINE MAKES AN INSTRUCTION HAVE THE PROPER A ADDRESS FIELD
                11AB  3155 ;
                11AB  3156 ;  INPUT CONDITIONS:
                11AB  3157 ;       A_ADDRS   = DATA TO BE INSERTED INTO THE A ADDRESS FIELD (BITS 9-10)
                11AB  3158 ;       H + L     = POINTS TO THE 3 BYTE INSTRUCTION TO MODIFY
                11AB  3159 ;
                11AB  3160 ;****************************************************************************
                11AB  3161
                11AB  3162 MAKE_A:              INX     H                                   ;MOVE TO SECOND BYTE
           23   11AB                  .BYTE     <H*8> ! 3
                11AC  3163
                11AC  3164                      ORA     A                                   ;CLEAR THE CARRY FOR ROTATES
           B7   11AC                  .BYTE     ^0260 ! A
```

```
              11AD  3165
              11AD  3166                    LDA     A_ADDRS                         ;PUT BIT 2 OF B_ADDRS INTO
        3A    11AD               .BYTE      ^072
      0163'   11AE               .WORD      <A_ADDRS-HEAD>
              11B0  3167                    RAL                                     ;MOVE TO BITS 9 - 10
        17    11B0               .BYTE      ^027
              11B1  3168                    ORA     M
        B6    11B1               .BYTE      ^0260 ! M
              11B2  3169                    MOV     M,A                             ;OR IT INTO INSTRUCTION
        77    11B2               .BYTE      ^0100 ! <M*8> ! A
              11B3  3170
              11B3  3171                    RET
        C9    11B3               .BYTE      ^0311
              11B4  3172
              11B4  3173
              11B4  3174 ;*************************************************************************
              11B4  3175 ;
              11B4  3176 ;  READ_DATA_32_R
              11B4  3177 ;  THIS ROUTINE IS USED TO READ 32 BITS OF DATA FROM THE
              11B4  3178 ;  CPU 8 BITS AT A TIME VIA THE 2901
              11B4  3179 ;
              11B4  3180 ;*************************************************************************
              11B4  3181
              11B4  3182 READ_DATA_32_R: LXI     D,DATA3                         ;DE POINTS TO DATA AREA
        11    11B4               .BYTE      <D*8> ! 1
    00'AC'    11B5               .BYTE      <DATA3-HEAD>&255 , <<DATA3-HEAD>&^XFF00>/256
              11B7  3183                    CALL    1$                              ;READ BYTE AND STORE
        CD    11B7               .BYTE      ^0315
     11C9'    11B8               .WORD      <1$-HEAD>
              11BA  3184
              11BA  3185                    LXI     D,DATA2                         ;DE POINTS TO DATA AREA
        11    11BA               .BYTE      <D*8> ! 1
    00'AB'    11BB               .BYTE      <DATA2-HEAD>&255 , <<DATA2-HEAD>&^XFF00>/256
              11BD  3186                    CALL    1$                              ;READ NEXT BYTE AND STORE
        CD    11BD               .BYTE      ^0315
     11C9'    11BE               .WORD      <1$-HEAD>
              11C0  3187
              11C0  3188                    LXI     D,DATA1                         ;DE POINTS TO DATA AREA
        11    11C0               .BYTE      <D*8> ! 1
    00'AA'    11C1               .BYTE      <DATA1-HEAD>&255 , <<DATA1-HEAD>&^XFF00>/256
              11C3  3189                    CALL    1$                              ;READ NEXT BYTE AND STORE
        CD    11C3               .BYTE      ^0315
     11C9'    11C4               .WORD      <1$-HEAD>
              11C6  3190
              11C6  3191                    LXI     D,DATA0                         ;DE POINTS TO DATA AREA
        11    11C6               .BYTE      <D*8> ! 1
    00'A9'    11C7               .BYTE      <DATA0-HEAD>&255 , <<DATA0-HEAD>&^XFF00>/256
              11C9  3192                                                            ; READ NEXT BYTE AND STORE
              11C9  3193
              11C9  3194 1$:                OUT     YBUSRD
     EC D3    11C9               .BYTE      ^0323 , YBUSRD&255          ;register A
              11CB  3195                    IN      READ                            ;READ MOST SIG. BYTE
     80 DB    11CB               .BYTE      ^0333 , READ&255            ;to register A
              11CD  3196                    STAX    D                               ;STORE IN DATA BUFFER
        12    11CD               .BYTE      <D*8> ! 2
              11CE  3197                    CALL    SHIFT_R_2901_R                  ;READ NEXT BYTE
        CD    11CE               .BYTE      ^0315
```

```
1250' 11CF                .WORD   <SHIFT_R_2901_R-HEAD>
      11D1  3198                  RET
   C9 11D1                .BYTE   ^0311
      11D2  3199
      11D2  3200
      11D2  3201 ;***************************************************************************
      11D2  3202 ;
      11D2  3203 ;   WRITE_DATA_32_R
      11D2  3204 ;   THIS ROUTINE IS USED TO WRITE 32 BITS OF DATA TO THE CPU
      11D2  3205 ;   DATA WRITES TO THE CPU ARE DONE IN TWO DIFFERENT MODES
      11D2  3206 ;   SLOW MODE: AND FAST MODE:  SLOW MODE USES NO SUPPORT MICRO CODE
      11D2  3207 ;   IN THE WCS MEMORY, AND THE FAST MODE DOES. THE MODE IS INITIALLY
      11D2  3208 ;   SLOW MODE UNTIL A WCS FILE IMAGE IS LOADED.  THEN IT IS SWITCHED TO
      11D2  3209 ;   FAST MODE UNLESS THERE IS AN ERROR IN THE FAST MODE VERIFY.
      11D2  3210 ;
      11D2  3211 ;***************************************************************************
      11D2  3212
      11D2  3213 WRITE_DATA_32_R:
      11D2  3214                  IFN     FAST_WRITE
   3A 11D2                .BYTE   ^072
02FC' 11D3                .WORD   <FAST_WRITE-HEAD>
   0F 11D5                .BYTE   ^017
   DA 11D6                .BYTE   ^0332
120A' 11D7                .WORD   <2049$-HEAD>
      11D9  3215                                                      ;SLOW WRITE
      11D9  3216                  LXI     H,X_CLR_WR0                 ;CLEAR WORKING REG AND COMPLIM.
   21 11D9                .BYTE   <H*8> ! 1
00'A1' 11DA               .BYTE   <X_CLR_WR0-HEAD>&255 , <<X_CLR_WR0-HEAD>&^XFF00>/256
      11DC  3217                  CALL    PERFORM_CSR_R               ;TO MAKE ALL 1'S THEN ROTATE
   CD 11DC                .BYTE   ^0315
12F2' 11DD                .WORD   <PERFORM_CSR_R-HEAD>
      11DF  3218                                                      ;LEFT TO MAKE A 1 AND ASH LEFT
      11DF  3219                                                      ;TO MAKE A ZERO
      11DF  3220
      11DF  3221                  DO      32
   21 11DF                .BYTE   <H*8> ! 1
00'55' 11E0               .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
   46 11E2                .BYTE   ^0100 ! <B*8> ! M
   C5 11E3                .BYTE   ^0305 ! <8*B>
20 3E 11E4                .BYTE   <A*8> ! 6 , 32&255
   77 11E6                .BYTE   ^0100 ! <M*8> ! A
      11E7         2050$:
      11E7  3222
      11E7  3223                  LXI     H,DATA_SHIFT+4              ;SHIFT DATA INTO CPU
   21 11E7                .BYTE   <H*8> ! 1
00'AC' 11E8               .BYTE   <DATA_SHIFT+4-HEAD>&255 , <<DATA_SHIFT+4-HEAD>&^XFF00>/256
      11EA  3224                  MVI     C,4
04 0E 11EA                .BYTE   <C*8> ! 6 , 4&255
      11EC  3225                  CALL    SHIFTER1_R
   CD 11EC                .BYTE   ^0315
0EC1' 11ED                .WORD   <SHIFTER1_R-HEAD>
      11EF  3226
      11EF  3227                  IFC
   D2 11EF                .BYTE   ^0322
11FB' 11F0                .WORD   <2051$-HEAD>
      11F2  3228                  LXI     H,X_ROT_L                   ;ADDR OF CSR INSTS TO EXECUTE
   21 11F2                .BYTE   <H*8> ! 1
```

```
        00'79'  11F3                   .BYTE   <X_ROT_L-HEAD>&255 , <<X_ROT_L-HEAD>&^XFF00>/256
                11F5   3229            CALL    PERFORM_CSR_R           ;MAKE A 1 BY END AROUND CARRY
            CD  11F5                   .BYTE   ^0315
         12F2'  11F6                   .WORD   <PERFORM_CSR_R-HEAD>
                11F8   3230
                11F8   3231            ELSE
            C3  11F8                   .BYTE   ^0303
         11FE'  11F9                   .WORD   <2052$-HEAD>
                11FB          2051$:                                   ;GENERATE LOCAL SYMBOL NAME
                11FB   3232            CALL    SHIFT_L_2901_R          ;MAKE A 0 BY SHIFT IN ZERO
            CD  11FB                   .BYTE   ^0315
         1249'  11FC                   .WORD   <SHIFT_L_2901_R-HEAD>
                11FE   3233            ENDIF
                11FE          2052$:                                   ;GENERATE LCL 2052 NAME
                11FE   3234
                11FE   3235            ENDDO
            21  11FE                   .BYTE   <H*8> ! 1
        00'55'  11FF                   .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
            35  1201                   .BYTE   ^05 ! <8*M>
            C2  1202                   .BYTE   ^0302
         11E7'  1203                   .WORD   <2050$-HEAD>
            C1  1205                   .BYTE   ^0301 ! <8*B>
            70  1206                   .BYTE   ^0100 ! <M*8> ! B
                1207   3236
                1207   3237            ELSE
            C3  1207                   .BYTE   ^0303
         1248'  1208                   .WORD   <2053$-HEAD>
                120A          2049$:                                   ;GENERATE LOCAL SYMBOL NAME
                120A   3238
                120A   3239            LXI     H,WCS_DAT_32_ADD        ;FAST WRITE
            21  120A                   .BYTE   <H*8> ! 1
         06 00  120B                   .BYTE   <WCS_DAT_32_ADD-HEAD>&255 , <<WCS_DAT_32_ADD-HEAD>&^XFF00>/256
                120D   3240            MOV     A,H
            7C  120D                   .BYTE   ^0100 ! <A*8> ! H
                120E   3241            MOV     H,L
            65  120E                   .BYTE   ^0100 ! <H*8> ! L
                120F   3242            MOV     L,A
            6F  120F                   .BYTE   ^0100 ! <L*8> ! A
                1210   3243            SHLD    UPC_VALUE
            22  1210                   .BYTE   ^042
         00C2'  1211                   .WORD   <UPC_VALUE-HEAD>
                1213   3244            CALL    LOAD_UPC_R
            CD  1213                   .BYTE   ^0315
         0F19'  1214                   .WORD   <LOAD_UPC_R-HEAD>
                1216   3245
                1216   3246            CALL    NOP_CSR_R               ;SET UP SUBROUTINE
            CD  1216                   .BYTE   ^0315
         0ECA'  1217                   .WORD   <NOP_CSR_R-HEAD>
                1219   3247
                1219   3248            CALL    MICRO_STEP_CPU_R        ;EXEC INIT FOR SUB.
            CD  1219                   .BYTE   ^0315
         12A0'  121A                   .WORD   <MICRO_STEP_CPU_R-HEAD>
                121C   3249            CALL    MICRO_STEP_CPU_R
            CD  121C                   .BYTE   ^0315
         12A0'  121D                   .WORD   <MICRO_STEP_CPU_R-HEAD>
                121F   3250
                121F   3251            DO      32
```

```
     21  121F              .BYTE   <H*8> ! 1
 00'55'  1220              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46  1222              .BYTE   ^0100 ! <B*8> ! M
     C5  1223              .BYTE   ^0305 ! <8*B>
  20 3E  1224              .BYTE   <A*8> ! 6 , 32&255
     77  1226              .BYTE   ^0100 ! <M*8> ! A
         1227        2054$:
         1227  3252
         1227  3253                LXI     H,DATA_SHIFT+4          ;POINT TO END OF DATA AREA
     21  1227              .BYTE   <H*8> ! 1
 00'AC'  1228              .BYTE   <DATA_SHIFT+4-HEAD>&255 , <<DATA_SHIFT+4-HEAD>&^XFF00>/256
         122A  3254                MVI     C,4                     ;BYTES TO SHIFT IN REG C
  04 0E  122A              .BYTE   <C*8> ! 6 , 4&255
         122C  3255                CALL    SHIFTER1_R
     CD  122C              .BYTE   ^0315
  0EC1'  122D              .WORD   <SHIFTER1_R-HEAD>
         122F  3256
         122F  3257                OUT     CLRATN                  ;SET A ZERO TO BE READ
  AB D3  122F              .BYTE   ^0323 , CLRATN&255      ;register A
         1231  3258
         1231  3259                IFC
     D2  1231              .BYTE   ^0322
  1236'  1232              .WORD   <2055$-HEAD>
         1234  3260                OUT     SETATN                  ;SET A ONE TO BE READ
  AA D3  1234              .BYTE   ^0323 , SETATN&255      ;register A
         1236  3261                ENDIF
         1236        2055$:                                        ;GENERATE LCL 2055 NAME
         1236  3262
         1236  3263                CALL    MICRO_STEP_CPU_R        ;CYCLE THROUGH LOOP IN SUB.
     CD  1236              .BYTE   ^0315
  12A0'  1237              .WORD   <MICRO_STEP_CPU_R-HEAD>
         1239  3264                CALL    MICRO_STEP_CPU_R
     CD  1239              .BYTE   ^0315
  12A0'  123A              .WORD   <MICRO_STEP_CPU_R-HEAD>
         123C  3265                CALL    MICRO_STEP_CPU_R
     CD  123C              .BYTE   ^0315
  12A0'  123D              .WORD   <MICRO_STEP_CPU_R-HEAD>
         123F  3266
         123F  3267                ENDDO
     21  123F              .BYTE   <H*8> ! 1
 00'55'  1240              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     35  1242              .BYTE   ^05 ! <8*M>
     C2  1243              .BYTE   ^0302
  1227'  1244              .WORD   <2054$-HEAD>
     C1  1246              .BYTE   ^0301 ! <8*B>
     70  1247              .BYTE   ^0100 ! <M*8> ! B
         1248  3268
         1248  3269                ENDIF
         1248        2053$:                                        ;GENERATE LCL 2053 NAME
         1248  3270
         1248  3271                RET
     C9  1248              .BYTE   ^0311
         1249  3272
         1249  3273
         1249  3274  ;*****************************************************************************
         1249  3275  ;
         1249  3276  ;   SHIFT_L_2901_R
```

```
                        1249  3277 ;  THIS ROUTINE SHIFTS THE DATA IN THE 2901 LEFT 1 BIT THIS INCLUDES
                        1249  3278 ;  SHIFTING A ZERO INTO THE LSB
                        1249  3279 ;
                        1249  3280 ;*****************************************************************************
                        1249  3281
                        1249  3282 SHIFT_L_2901_R: LXI      H,X_SHIFT_L                 ;ADDR OF CSR INSTS TO EXECUTE
                  21    1249                .BYTE    <H*8> ! 1
               00'75'   124A                .BYTE    <X_SHIFT_L-HEAD>&255 , <<X_SHIFT_L-HEAD>&^XFF00>/256
                        124C  3283                   CALL     PERFORM_CSR_R
                  CD    124C                .BYTE    ^0315
               12F2'    124D                .WORD    <PERFORM_CSR_R-HEAD>
                        124F  3284
                        124F  3285                   RET
                  C9    124F                .BYTE    ^0311
                        1250  3286
                        1250  3287 ;*****************************************************************************
                        1250  3288 ;
                        1250  3289 ;   SHIFT_R_2901_R
                        1250  3290 ;   THIS ROUTINE SHIFTS THE DATA IN THE 2901 RIGHT 8 BITS AND LEAVES
                        1250  3291 ;   THE LEAST SIG. BYTE ON THE Y-BUS TO BE READ
                        1250  3292 ;
                        1250  3293 ;*****************************************************************************
                        1250  3294
                        1250  3295 SHIFT_R_2901_R: LXI      H,X_SHIFT_R                 ;ADDR OF CSR INSTS TO EXECUTE
                  21    1250                .BYTE    <H*8> ! 1
               00'85'   1251                .BYTE    <X_SHIFT_R-HEAD>&255 , <<X_SHIFT_R-HEAD>&^XFF00>/256
                        1253  3296                   CALL     PERFORM_CSR_R
                  CD    1253                .BYTE    ^0315
               12F2'    1254                .WORD    <PERFORM_CSR_R-HEAD>
                        1256  3297
                        1256  3298                   RET
                  C9    1256                .BYTE    ^0311
                        1257  3299
                        1257  3300 ;*****************************************************************************
                        1257  3301 ;
                        1257  3302 ;   MICRO_STEPER
                        1257  3303 ;   THIS ROUTINE SINGLE STEPS THE CPU. IF THE MACHINE IS IN SPACE BAR
                        1257  3304 ;   MODE ANY CHAR OTHER THAN SPACE WILL CLEAR EXECUTE MODE AND STOP
                        1257  3305 ;   MICRO STEPING.  IF THE MACHINE IS IN COUNT MODE IT WILL DECREMENT
                        1257  3306 ;   THE COUNT AND STOP MICRO STEPING AT 0 COUNT
                        1257  3307 ;
                        1257  3308 ;*****************************************************************************
                        1257  3309
                        1257  3310 MICRO_STEPER:     IFEQI    MICRO_STEP,1                ;SPACE BAR MODE
                  3A    1257                .BYTE    ^072
               038A'    1258                .WORD    <MICRO_STEP-HEAD>
                  FE    125A                .BYTE    ^0376
                  01    125B                .BYTE    1
                  C2    125C                .BYTE    ^0302
               1285'    125D                .WORD    <2056$-HEAD>
                        125F  3311
                        125F  3312 1$:               CALL     RSVECT                      ;CALL READ SILO ROUTINE IN
                  CD    125F                .BYTE    ^0315
               413D     1260                .WORD    <RSVECT-HEAD>
                        1262  3313                                                        ; BOOT BLOCK.  IF CHAR FOUND,
                        1262  3314                                                        ; CARRY IS SET AND CHAR IS IN
                        1262  3315                                                        ; ACCUMULATOR
```

```
              1262  3316
              1262  3317              JNC     1$                        ;LOOP UNTIL CHAR RECEIVED
          D2  1262           .BYTE    ^0322
       125F'  1263           .WORD    <1$-HEAD>
              1265  3318
              1265  3319              ANI     HEX_7F                    ;STRIP ASCII PARITY BIT
          E6  1265           .BYTE    ^0346
          7F  1266           .BYTE    HEX_7F
              1267  3320              CPI     SPACE_A                   ;SPACE?
          FE  1267           .BYTE    ^0376
          20  1268           .BYTE    SPACE_A
              1269  3321              JZ      2$                        ;JUMP TO SINGLE STEP IF SPACE
          CA  1269           .BYTE    ^0312
       127C'  126A           .WORD    <2$-HEAD>
              126C  3322
              126C  3323              CALL    STOP_CPU                  ;STOP CPU, SAVE CSR AND UPC
          CD  126C           .BYTE    ^0315
       10C9'  126D           .WORD    <STOP_CPU-HEAD>
              126F  3324              CLEAR   MICRO_STEP                ;CLEAR FLAG
          AF  126F           .BYTE    ^0250 ! A              ;with A
          32  1270           .BYTE    ^062
       038A'  1271           .WORD    <MICRO_STEP-HEAD>
              1273  3325              CALL    SAVE_WR                   ;SAVE CPU WORKING REGS
          CD  1273           .BYTE    ^0315
       0C11'  1274           .WORD    <SAVE_WR-HEAD>
              1276  3326              CALL    SET_FOR_CONT_R            ;NO SPACE, END MICRO STEPPING
          CD  1276           .BYTE    ^0315
       107B'  1277           .WORD    <SET_FOR_CONT_R-HEAD>
              1279  3327              JMP     RESTART_CPU               ;CONTINUE COMES HERE
          C3  1279           .BYTE    ^0303
       110E'  127A           .WORD    <RESTART_CPU-HEAD>
              127C  3328
              127C  3329 2$:          CALL    GSVECT                    ;CALL GET SILO TO POP OUT SPACE
          CD  127C           .BYTE    ^0315
        4145  127D           .WORD    <GSVECT-HEAD>
              127F  3330              CALL    MICRO_STEP_CPU_R          ;STEP MACHINE AND PRINT ADDRESS
          CD  127F           .BYTE    ^0315
       12A0'  1280           .WORD    <MICRO_STEP_CPU_R-HEAD>
              1282  3331
              1282  3332              ELSE
          C3  1282           .BYTE    ^0303
       129F'  1283           .WORD    <2057$-HEAD>
              1285       2056$:                                         ;GENERATE LOCAL SYMBOL NAME
              1285  3333
              1285  3334              CALL    MICRO_STEP_CPU_R          ;COUNT MODE
          CD  1285           .BYTE    ^0315
       12A0'  1286           .WORD    <MICRO_STEP_CPU_R-HEAD>
              1288  3335              LXI     H,STEP_CNT                ;DECREMENT STEP COUNT
          21  1288           .BYTE    <H*8> ! 1
      04'09'  1289           .BYTE    <STEP_CNT-HEAD>&255 , <<STEP_CNT-HEAD>&^XFF00>/256
              128B  3336              CALL    DECR_WORD_R
          CD  128B           .BYTE    ^0315
       12BC'  128C           .WORD    <DECR_WORD_R-HEAD>
              128E  3337              RNZ                               ;RETURN  UNTIL COUNT EXHAUSTED
          C0  128E           .BYTE    ^0300
              128F  3338
              128F  3339              CALL    STOP_CPU                  ;STOP CPU, SAVE CSR AND UPC
```

```
     CD  128F                  .BYTE   ^0315
  10C9'  1290                  .WORD   <STOP_CPU-HEAD>
         1292  3340                    CLEAR   MICRO_STEP              ;CLEAR FLAG
     AF  1292                  .BYTE   ^0250 ! A              ;with A
     32  1293                  .BYTE   ^062
  038A'  1294                  .WORD   <MICRO_STEP-HEAD>
         1296  3341                    CALL    SAVE_WR                 ;SAVE CPU WORKING REGS
     CD  1296                  .BYTE   ^0315
  0C11'  1297                  .WORD   <SAVE_WR-HEAD>
         1299  3342                    CALL    SET_FOR_CONT_R          ;NO SPACE, END MICRO STEPPING
     CD  1299                  .BYTE   ^0315
  107B'  129A                  .WORD   <SET_FOR_CONT_R-HEAD>
         129C  3343                    JMP     RESTART_CPU             ;CONTINUE COMES HERE
     C3  129C                  .BYTE   ^0303
  110E'  129D                  .WORD   <RESTART_CPU-HEAD>
         129F  3344
         129F  3345                    ENDIF
         129F        2057$:                                            ;GENERATE LCL 2057 NAME
         129F  3346
         129F  3347                    RET
     C9  129F                  .BYTE   ^0311
         12A0  3348
         12A0  3349
         12A0  3350  ;******************************************************************************
         12A0  3351  ;
         12A0  3352  ;  MICRO_STEP_CPU_R
         12A0  3353  ;  THIS ROUTINE CAUSES THE MACHINE TO DO ONE MICRO INSTRUCTION
         12A0  3354  ;
         12A0  3355  ;******************************************************************************
         12A0  3356
         12A0  3357  MICRO_STEP_CPU_R:
         12A0  3358                    OUT     SETSS
  23 D3  12A0                  .BYTE   ^0323 , SETSS&255      ;register A
         12A2  3359                    OUT     CLRSS                       ;SINGLE STEP CPU
  22 D3  12A2                  .BYTE   ^0323 , CLRSS&255      ;register A
         12A4  3360
         12A4  3361                    RET
     C9  12A4                  .BYTE   ^0311
         12A5  3362
         12A5  3363
         12A5  3364  ;************************************************************************
         12A5  3365  ;
         12A5  3366  ;  INC_TEMPW_5
         12A5  3367  ;  THIS ROUTINE INCREMENTS THE VALUE OF TEMP_WORD BY 5
         12A5  3368  ;
         12A5  3369  ;************************************************************************
         12A5  3370
         12A5  3371  INC_TEMPW_5:      MVI     B,0
  00 06  12A5                  .BYTE   <B*8> ! 6 , 0&255
         12A7  3372                    MVI     C,5
  05 0E  12A7                  .BYTE   <C*8> ! 6 , 5&255
         12A9  3373                    LHLD    TEMP_WORD
     2A  12A9                  .BYTE   ^052
  0419'  12AA                  .WORD   <TEMP_WORD-HEAD>
         12AC  3374                    DAD     B                       ;ADD 5 TO TEMP_WORD
     09  12AC                  .BYTE   <B*8> ! 9
         12AD  3375                    SHLD    TEMP_WORD               ;TO MOVE TO NEXT FLAG NAME
```

```
      22  12AD                  .BYTE   ^042
   0419'  12AE                  .WORD   <TEMP_WORD-HEAD>
          12B0  3376
          12B0  3377                    RET
      C9  12B0                  .BYTE   ^0311
          12B1  3378
          12B1  3379
          12B1  3380 ;***********************************************************************
          12B1  3381 ;
          12B1  3382 ;   INC_WORD_R
          12B1  3383 ;   THIS ROUTINE INCREMENTS A WORD OF DATA
          12B1  3384 ;
          12B1  3385 ;   INPUT CONDITIONS:
          12B1  3386 ;        H+L = POINTER TO THE WORD TO INCREMENT
          12B1  3387 ;   OUTPUT CONDITIONS:
          12B1  3388 ;        CONDITION CODES
          12B1  3389 ;
          12B1  3390 ;***********************************************************************
          12B1  3391
          12B1  3392 INC_WORD_R:      INX     H                               ;POINT TO LOW ORDER PART
      23  12B1                  .BYTE   <H*8> ! 3
          12B2  3393
          12B2  3394                    MOV     A,M
      7E  12B2                  .BYTE   ^0100 ! <A*8> ! M
          12B3  3395                    ADI     1
      C6  12B3                  .BYTE   ^0306
      01  12B4                  .BYTE   1
          12B5  3396                    MOV     M,A                             ;INC VALUE IN LOW ORD. PART
      77  12B5                  .BYTE   ^0100 ! <M*8> ! A
          12B6  3397                    DCX     H                               ;MOVE TO HIGH ORDER PART
      2B  12B6                  .BYTE   <H*8> ! 11
          12B7  3398
          12B7  3399                    MOV     A,M
      7E  12B7                  .BYTE   ^0100 ! <A*8> ! M
          12B8  3400                    ACI     0                               ;ADD ZERO + CARRY
      CE  12B8                  .BYTE   ^0316
      00  12B9                  .BYTE   0
          12BA  3401                    MOV     M,A
      77  12BA                  .BYTE   ^0100 ! <M*8> ! A
          12BB  3402
          12BB  3403                    RET
      C9  12BB                  .BYTE   ^0311
          12BC  3404
          12BC  3405
          12BC  3406 ;***********************************************************************
          12BC  3407 ;
          12BC  3408 ;   DECR_WORD_R
          12BC  3409 ;   THIS ROUTINE DECREMENTS A WORD OF DATA
          12BC  3410 ;
          12BC  3411 ;   INPUT CONDITIONS:
          12BC  3412 ;        H+L = POINTER TO THE WORD TO DECREMENT
          12BC  3413 ;   OUTPUT CONDITIONS:
          12BC  3414 ;        CONDITION CODES
          12BC  3415 ;
          12BC  3416 ;***********************************************************************
          12BC  3417
          12BC  3418 DECR_WORD_R:     INX     H                               ;MOVE TO SECOND BYTE
      23  12BC             .BYTE   <H*8> ! 3
          12BD   3419
          12BD   3420              MOV     A,M
      7E  12BD             .BYTE   ^0100 ! <A*8> ! M
          12BE   3421              SUI     1                               ;DEC VALUE IN LOW ORD. PART
      D6  12BE             .BYTE   ^0326
      01  12BF             .BYTE   1
          12C0   3422              MOV     M,A
      77  12C0             .BYTE   ^0100 ! <M*8> ! A
          12C1   3423              DCX     H                               ;MOVE TO HIGH ORD. PART
      2B  12C1             .BYTE   <H*8> ! 11
          12C2   3424
          12C2   3425              MOV     A,M
      7E  12C2             .BYTE   ^0100 ! <A*8> ! M
          12C3   3426              SBI     0                               ;SUB CARRY
      DE  12C3             .BYTE   ^0336                       ;with borrow
      00  12C4             .BYTE   0
          12C5   3427              MOV     M,A
      77  12C5             .BYTE   ^0100 ! <M*8> ! A
          12C6   3428
          12C6   3429              CPI     0
      FE  12C6             .BYTE   ^0376
      00  12C7             .BYTE   0
          12C8   3430              RNZ                                     ;CHECK FOR ZERO RESULT
      C0  12C8             .BYTE   ^0300
          12C9   3431              INX     H
      23  12C9             .BYTE   <H*8> ! 3
          12CA   3432              MOV     A,M
      7E  12CA             .BYTE   ^0100 ! <A*8> ! M
          12CB   3433              CPI     0
      FE  12CB             .BYTE   ^0376
      00  12CC             .BYTE   0
          12CD   3434              RET                                     ;SEND BACK COND. CODE
      C9  12CD             .BYTE   ^0311
          12CE   3435
          12CE   3436
          12CE   3437
          12CE   3438 ;*****************************************************************************
          12CE   3439 ;
          12CE   3440 ;  WRITE_LS_STAT
          12CE   3441 ;  THIS ROUTINE WRITES THE LS ERROR CONTROL WORD ONLY IF THE
          12CE   3442 ;  WCS IMAGE IS LOADED
          12CE   3443 ;
          12CE   3444 ;  THE ROUTINE CAN BE ENTERED AT THE SET BIT OR CLEAR BIT ENTRY POINT.
          12CE   3445 ;  IN THAT CASE, THE B REGISTER MUST BE LOADED WITH THE BIT TO SET OR CLEAR
          12CE   3446 ;  BEFORE ENTRY TO THIS ROUTINE.
          12CE   3447 ;
          12CE   3448 ;*****************************************************************************
          12CE   3449
          12CE   3450 SET_LS_STAT:      LDA     FLAGS                           ;GET CURRENT FLAGS
      3A  12CE             .BYTE   ^072
   005A'  12CF             .WORD   <FLAGS-HEAD>
          12D1   3451              ORA     B                               ;OR IN THIS BIT TO SET FLAG
      B0  12D1             .BYTE   ^0260 ! B
          12D2   3452              STA     FLAGS                           ;STORE NEW FLAGS
      32  12D2             .BYTE   ^062
   005A'  12D3             .WORD   <FLAGS-HEAD>
```

```
              12D5  3453                   JMP     WRITE_LS_STAT                    ;WRITE FLAGS IN LS
        C3    12D5                .BYTE    ^0303
    12DF'     12D6                .WORD    <WRITE_LS_STAT-HEAD>
              12D8  3454
              12D8  3455 CLEAR_LS_STAT:
              12D8  3456                   LDA     FLAGS                            ;GET CURRENT FLAGS
        3A    12D8                .BYTE    ^072
    005A'     12D9                .WORD    <FLAGS-HEAD>
              12DB  3457                   ANA     B                                ;AND IN THIS BIT TO CLEAR FLAG
        A0    12DB                .BYTE    ^0240 ! B
              12DC  3458                   STA     FLAGS                            ;STORE NEW FLAGS
        32    12DC                .BYTE    ^062
    005A'     12DD                .WORD    <FLAGS-HEAD>
              12DF  3459
              12DF  3460 WRITE_LS_STAT:    IF      WCS_LOADED
        3A    12DF                .BYTE    ^072
    058B'     12E0                .WORD    <WCS_LOADED-HEAD>
        0F    12E2                .BYTE    ^017
        D2    12E3                .BYTE    ^0322
    12F1'     12E4                .WORD    <2058$-HEAD>
              12E6  3461
              12E6  3462                   LDA     FLAGS                            ;GET STATUS FLAGS
        3A    12E6                .BYTE    ^072
    005A'     12E7                .WORD    <FLAGS-HEAD>
              12E9  3463                   STA     DATA3
        32    12E9                .BYTE    ^062
    00AC'     12EA                .WORD    <DATA3-HEAD>
              12EC  3464
              12EC  3465                   MVI     A,FLAG_LOC                       ;WRITE TO LS ERROR CONTROL LOC.
     48 3E    12EC                .BYTE    <A*8> ! 6 , FLAG_LOC&255
              12EE  3466                   CALL    WRITE_LS_R
        CD    12EE                .BYTE    ^0315
    1146'     12EF                .WORD    <WRITE_LS_R-HEAD>
              12F1  3467
              12F1  3468                   ENDIF
              12F1       2058$:                                                     ;GENERATE LCL 2058 NAME
              12F1  3469
              12F1  3470                   RET
        C9    12F1                .BYTE    ^0311
              12F2  3471
              12F2  3472
              12F2  3473 ;******************************************************************************
              12F2  3474 ;
              12F2  3475 ;   PERFORM_CSR_R
              12F2  3476 ;   THIS ROUTINE WILL PUT INSTRUCTIONS IN TO THE CSR AND EXECUTE THEM
              12F2  3477 ;
              12F2  3478 ;   INPUT CONDTIONS:
              12F2  3479 ;         H+L = POINTER TO INSTRUCTION TABLE
              12F2  3480 ;                 TABLE = CNT,INST,INST,.....
              12F2  3481 ;
              12F2  3482 ;******************************************************************************
              12F2  3483
              12F2  3484 PERFORM_CSR_R:
              12F2  3485                   MOV     A,M                              ;GET COUNT
        7E    12F2                .BYTE    ^0100 ! <A*8> ! M
              12F3  3486                   STA     CSR_CNT                          ;AND SAVE
        32    12F3                .BYTE    ^062
```

```
  025D' 12F4                 .WORD   <CSR_CNT-HEAD>
        12F6  3487
        12F6  3488                   INX     H
     23 12F6                 .BYTE   <H*8> ! 3
        12F7  3489                   SHLD    TEMP_WORD
     22 12F7                 .BYTE   ^042
  0419' 12F8                 .WORD   <TEMP_WORD-HEAD>
        12FA  3490
        12FA  3491 1$:               LHLD    TEMP_WORD
     2A 12FA                 .BYTE   ^052
  0419' 12FB                 .WORD   <TEMP_WORD-HEAD>
        12FD  3492                   LXI     D,CSR_VALUE                 ;MOVE 3 BYTES OF INST TO CSR_VALUE
     11 12FD                 .BYTE   <D*8> ! 1
 00'B8' 12FE                 .BYTE   <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
        1300  3493                   CALL    MOVER_3_R
     CD 1300                 .BYTE   ^0315
  0F5F' 1301                 .WORD   <MOVER_3_R-HEAD>
        1303  3494                   SHLD    TEMP_WORD
     22 1303                 .BYTE   ^042
  0419' 1304                 .WORD   <TEMP_WORD-HEAD>
        1306  3495
        1306  3496                   CALL    LOAD_CSR_R                  ;PUT INST IN CSR
     CD 1306                 .BYTE   ^0315
  0EE7' 1307                 .WORD   <LOAD_CSR_R-HEAD>
        1309  3497
        1309  3498                   OUT     SETSS
  23 D3 1309                 .BYTE   ^0323 , SETSS&255       ;register A
        130B  3499                   OUT     CLRSS                       ;SINGLE STEP CPU
  22 D3 130B                 .BYTE   ^0323 , CLRSS&255       ;register A
        130D  3500
        130D  3501                   LXI     H,CSR_CNT
     21 130D                 .BYTE   <H*8> ! 1
 02'5D' 130E                 .BYTE   <CSR_CNT-HEAD>&255 , <<CSR_CNT-HEAD>&^XFF00>/256
        1310  3502                   DCR     M                           ;DECREMENT THE COUNT
     35 1310                 .BYTE   ^05 ! <8*M>
        1311  3503                   JNZ     1$                          ;LOOP UNITL ZERO
     C2 1311                 .BYTE   ^0302
  12FA' 1312                 .WORD   <1$-HEAD>
        1314  3504
        1314  3505                   LXI     H,X_MOV_WRWR                ;LEAVE MOV INST IN CSR TO
     21 1314                 .BYTE   <H*8> ! 1
 00'9E' 1315                 .BYTE   <X_MOV_WRWR-HEAD>&255 , <<X_MOV_WRWR-HEAD>&^XFF00>/256
        1317  3506                   LXI     D,CSR_VALUE                 ;ENABLE Y-BUS
     11 1317                 .BYTE   <D*8> ! 1
 00'B8' 1318                 .BYTE   <CSR_VALUE-HEAD>&255 , <<CSR_VALUE-HEAD>&^XFF00>/256
        131A  3507                   CALL    MOVER_3_R
     CD 131A                 .BYTE   ^0315
  0F5F' 131B                 .WORD   <MOVER_3_R-HEAD>
        131D  3508
        131D  3509                   CALL    LOAD_CSR_R                  ;LOAD MOV
     CD 131D                 .BYTE   ^0315
  0EE7' 131E                 .WORD   <LOAD_CSR_R-HEAD>
        1320  3510
        1320  3511                   RET
     C9 1320                 .BYTE   ^0311
        1321  3512
        1321  3513
```

```
                1321  3514 ;*****************************************************************************
                1321  3515 ;
                1321  3516 ;   ATTENTION
                1321  3517 ;   THIS ATTENTION ROUTINE IS USED WHEN THE CPU IS EXECUTING TESTS(RUNNING)
                1321  3518 ;   IT IS BASICLY AN IDLE LOOP FOR THE 8085.  DURING THE IDLE LOOP
                1321  3519 ;   THE 8085 CHECKS FOR SPECIAL OCCURANCES SUCH AS ^C,^P,OR CPATTN
                1321  3520 ;   IF CPATTN SIGNAL COMES HIGH IT MEANS THAT THE CPU MICRO CODED
                1321  3521 ;   DIAGNOSTIC IS REQUESTING SOMETHING.  MICRO STEPPING IS DONE ONCE
                1321  3522 ;   FOR EACH ITTERATION OF THE IDLE LOOP
                1321  3523 ;
                1321  3524 ;*****************************************************************************
                1321  3525
                1321  3526 ATTENTION:              CLEAR   DATA_XFER_FLG
          AF    1321                    .BYTE   ^0250 ! A                  ;with A
          32    1322                    .BYTE   ^062
       025E'    1323                    .WORD   <DATA_XFER_FLG-HEAD>
                1325  3527                      CALL    RESET_TIMOUT                    ;INIT TIMOUTS AND XFER INFO
          CD    1325                    .BYTE   ^0315
       1932'    1326                    .WORD   <RESET_TIMOUT-HEAD>
                1328  3528
                1328  3529                      WHILE   RUNNING
                1328           4001$:   LDA     RUNNING
          3A    1328                    .BYTE   ^072
       0403'    1329                    .WORD   <RUNNING-HEAD>
          0F    132B                    .BYTE   ^017
          D2    132C                    .BYTE   ^0322
       137E'    132D                    .WORD   <2059$-HEAD>
                132F  3530
                132F  3531                      LDA     MICRO_STEP                      ;GET MICRO_STEP FLAG
          3A    132F                    .BYTE   ^072
       038A'    1330                    .WORD   <MICRO_STEP-HEAD>
                1332  3532                      ORA     A                               ;SET CONDITION CODES
          B7    1332                    .BYTE   ^0260 ! A
                1333  3533                      CNZ     MICRO_STEPER                    ;CALL IF MICRO STEP
          C4    1333                    .BYTE   ^0304
       1257'    1334                    .WORD   <MICRO_STEPER-HEAD>
                1336  3534
                1336  3535                      IN      CPATTN
       83 DB    1336                    .BYTE   ^0333 , CPATTN&255         ;to register A
                1338  3536                      RAR
          1F    1338                    .BYTE   ^037
                1339  3537                      IFC                                     ;IF CPU_ATTENTION
          D2    1339                    .BYTE   ^0322
       1375'    133A                    .WORD   <2060$-HEAD>
                133C  3538
                133C  3539                      MVI     A,1
       01 3E    133C                    .BYTE   <A*8> ! 6 , 1&255
                133E  3540                      STA     APT_MESSAGE_CODE+1              ;SET APT START FLAG
          32    133E                    .BYTE   ^062
       0011'    133F                    .WORD   <APT_MESSAGE_CODE+1-HEAD>
                1341  3541
                1341  3542                      CALL    RESET_TIMOUT                    ;CPU HEARD, SO RESET TIMOUT
          CD    1341                    .BYTE   ^0315
       1932'    1342                    .WORD   <RESET_TIMOUT-HEAD>
                1344  3543                      CALL    STOP_CPU
          CD    1344                    .BYTE   ^0315
       10C9'    1345                    .WORD   <STOP_CPU-HEAD>
```

```
             1347  3544
             1347  3545                     LHLD    SAVED_UPC                 ;SAVE UPC WHEN GOING TO
        2A   1347                  .BYTE    ^052
     00C4'   1348                  .WORD    <SAVED_UPC-HEAD>                  ;SUBROUTINE
             134A  3546                     SHLD    UPC_SUB
        22   134A                  .BYTE    ^042
     00C6'   134B                  .WORD    <UPC_SUB-HEAD>
             134D  3547
             134D  3548                     CALL    SAVE_WR
        CD   134D                  .BYTE    ^0315
     0C11'   134E                  .WORD    <SAVE_WR-HEAD>
             1350  3549
             1350  3550                     CALL    CHECK_CNTLC               ;IF CONTROL C TYPED STOP
        CD   1350                  .BYTE    ^0315
     1073'   1351                  .WORD    <CHECK_CNTLC-HEAD>
             1353  3551
             1353  3552                     MVI     A,STATUS
     40 3E   1353                  .BYTE    <A*8> ! 6 , STATUS&255
             1355  3553                     CALL    READ_LS_R                 ;READ LS COMMAND + STATUS
        CD   1355                  .BYTE    ^0315
     1167'   1356                  .WORD    <READ_LS_R-HEAD>
             1358  3554                     CALL    DO_COMMANDS
        CD   1358                  .BYTE    ^0315
     137F'   1359                  .WORD    <DO_COMMANDS-HEAD>
             135B  3555
             135B  3556                     IFN     EOS_FLG                   ;IF EOS DONT RESTART
        3A   135B                  .BYTE    ^072
     0056'   135C                  .WORD    <EOS_FLG-HEAD>
        0F   135E                  .BYTE    ^017
        DA   135F                  .BYTE    ^0332
     1375'   1360                  .WORD    <2061$-HEAD>
             1362  3557
             1362  3558                     IFN     TEST_ZERO                 ;IF TEST 0 DONT RESTART
        3A   1362                  .BYTE    ^072
     0447'   1363                  .WORD    <TEST_ZERO-HEAD>
        0F   1365                  .BYTE    ^017
        DA   1366                  .BYTE    ^0332
     1375'   1367                  .WORD    <2062$-HEAD>
             1369  3559                     CALL    RESTORE_WR
        CD   1369                  .BYTE    ^0315
     0C0A'   136A                  .WORD    <RESTORE_WR-HEAD>
             136C  3560                     LHLD    UPC_SUB                   ;RETURN FROM SUBROUTINE
        2A   136C                  .BYTE    ^052
     00C6'   136D                  .WORD    <UPC_SUB-HEAD>
             136F  3561                     SHLD    STARTING_UPC              ;START CPU AGAIN
        22   136F                  .BYTE    ^042
     0407'   1370                  .WORD    <STARTING_UPC-HEAD>
             1372  3562                     CALL    START_CPU
        CD   1372                  .BYTE    ^0315
     10FF'   1373                  .WORD    <START_CPU-HEAD>
             1375  3563                     ENDIF
             1375        2062$:                                               ;GENERATE LCL 2062 NAME
             1375  3564
             1375  3565                     ENDIF
             1375        2061$:                                               ;GENERATE LCL 2061 NAME
             1375  3566
             1375  3567                     ENDIF
```

```
              1375        2060$:                                                  ;GENERATE LCL 2060 NAME
              1375  3568
              1375  3569                         CALL    GCVECT                   ;CHECK FOR OPERATOR REQUEST (^P)
         CD   1375                 .BYTE         ^0315
       4129   1376                 .WORD         <GCVECT-HEAD>
              1378  3570                         CALL    TIMOUT                   ;CHECK FOR TIMOUT
         CD   1378                 .BYTE         ^0315
      1907'   1379                 .WORD         <TIMOUT-HEAD>
              137B  3571
              137B  3572                         ENDWHILE
         C3   137B                 .BYTE         ^0303
      1328'   137C                 .WORD         <4001$-HEAD>
              137E        2059$:                                                  ;GENERATE LCL 2059 NAME
              137E  3573
              137E  3574                         RET
         C9   137E                 .BYTE         ^0311
              137F  3575
              137F  3576
              137F  3577 ;*************************************************************************************
              137F  3578 ;
              137F  3579 ;  DO_COMMANDS
              137F  3580 ;  THIS ROUTINE DECODES THE LS COMMAND AND STATUS WORD AND CALLS ROUTINES
              137F  3581 ;  TO PERFORM THE FUNCTIONS WHERE NECESSARY.
              137F  3582 ;
              137F  3583 ;*************************************************************************************
              137F  3584
              137F  3585 DO_COMMANDS:            LXI     D,COMMAND0               ;DESTINATION
         11   137F                 .BYTE         <D*8> ! 1
    00'AF'    1380                 .BYTE         <COMMAND0-HEAD>&255 , <<COMMAND0-HEAD>&^XFF00>/256
              1382  3586                         CALL    MOV_FROM_DATA0           ;MOVE 4 BYTES OF DATA FROM
         CD   1382                 .BYTE         ^0315
      0F70'   1383                 .WORD         <MOV_FROM_DATA0-HEAD>
              1385  3587                                                          ; DATA0
              1385  3588                         IFMBI   COMMAND3,BAD_STATUS      ;BIT 4 = BAD RL02 DISK STATUS
         3A   1385                 .BYTE         ^072
      00B2'   1386                 .WORD         <COMMAND3-HEAD>
         E6   1388                 .BYTE         ^0346
         10   1389                 .BYTE         BAD_STATUS
         CA   138A                 .BYTE         ^0312
      1395'   138B                 .WORD         <2063$-HEAD>
              138D  3589                         SET     PACK_ERROR               ;SET FLAG INDICATING PACK ERROR
         AF   138D                 .BYTE         ^0250 ! A              ;with A
         3C   138E                 .BYTE         ^04 ! <8*A>
         32   138F                 .BYTE         ^062
      03D5'   1390                 .WORD         <PACK_ERROR-HEAD>
              1392  3590                         CALL    PACK_WARNING
         CD   1392                 .BYTE         ^0315
      165B'   1393                 .WORD         <PACK_WARNING-HEAD>
              1395  3591
              1395  3592                         ENDIF
              1395        2063$:                                                  ;GENERATE LCL 2063 NAME
              1395  3593
              1395  3594                         IFMBI   COMMAND3,WRONG_LAB       ;BIT 5 = CRD PACK NOT IN RL02
         3A   1395                 .BYTE         ^072
      00B2'   1396                 .WORD         <COMMAND3-HEAD>
         E6   1398                 .BYTE         ^0346
         20   1399                 .BYTE         WRONG_LAB
      CA  139A                 .BYTE   ^0312
   13A5'  139B                 .WORD   <2064$-HEAD>
          139D  3595                   SET     PACK_ERROR              ;SET FLAG INDICATING PACK ERROR
      AF  139D                 .BYTE   ^0250 ! A              ;with A
      3C  139E                 .BYTE   ^04 ! <8*A>
      32  139F                 .BYTE   ^062
   03D5'  13A0                 .WORD   <PACK_ERROR-HEAD>
          13A2  3596                   CALL    PACK_WARNING
      CD  13A2                 .BYTE   ^0315
   165B'  13A3                 .WORD   <PACK_WARNING-HEAD>
          13A5  3597
          13A5  3598                   ENDIF
          13A5        2064$:                                           ;GENERATE LCL 2064 NAME
          13A5  3599
          13A5  3600                   IFMBI   COMMAND3,UBE_PRES       ;BIT 6 = PRINT UBE PRESENT
      3A  13A5                 .BYTE   ^072
   00B2'  13A6                 .WORD   <COMMAND3-HEAD>
      E6  13A8                 .BYTE   ^0346
      40  13A9                 .BYTE   UBE_PRES
      CA  13AA                 .BYTE   ^0312
   13AD'  13AB                 .WORD   <2065$-HEAD>
          13AD  3601                   ENDIF
          13AD        2065$:                                           ;GENERATE LCL 2065 NAME
          13AD  3602
          13AD  3603                   IFMBI   COMMAND3,R80_PRES       ;BIT 7 = PRINT R80 PRESENT
      3A  13AD                 .BYTE   ^072
   00B2'  13AE                 .WORD   <COMMAND3-HEAD>
      E6  13B0                 .BYTE   ^0346
      80  13B1                 .BYTE   R80_PRES
      CA  13B2                 .BYTE   ^0312
   13B5'  13B3                 .WORD   <2066$-HEAD>
          13B5  3604                   ENDIF
          13B5        2066$:                                           ;GENERATE LCL 2066 NAME
          13B5  3605
          13B5  3606                   IFMBI   COMMAND2,WCSERR         ;BIT 8 = ERROR FOUND BY WCS
      3A  13B5                 .BYTE   ^072
   00B1'  13B6                 .WORD   <COMMAND2-HEAD>
      E6  13B8                 .BYTE   ^0346
      01  13B9                 .BYTE   WCSERR
      CA  13BA                 .BYTE   ^0312
   13C0'  13BB                 .WORD   <2067$-HEAD>
          13BD  3607                   CALL    WCS_ERROR
      CD  13BD                 .BYTE   ^0315
   1442'  13BE                 .WORD   <WCS_ERROR-HEAD>
          13C0  3608                   ENDIF
          13C0        2067$:                                           ;GENERATE LCL 2067 NAME
          13C0  3609
          13C0  3610                   IFMBI   COMMAND2,SETPAR_ERR     ;BIT 9 = SET PARITY ERROR
      3A  13C0                 .BYTE   ^072
   00B1'  13C1                 .WORD   <COMMAND2-HEAD>
      E6  13C3                 .BYTE   ^0346
      02  13C4                 .BYTE   SETPAR_ERR
      CA  13C5                 .BYTE   ^0312
   13D0'  13C6                 .WORD   <2068$-HEAD>
          13C8  3611                   SET     LS_SETPARERR            ;SET FLAG FOR USE LATER
      AF  13C8                 .BYTE   ^0250 ! A              ;with A
      3C  13C9                 .BYTE   ^04 ! <8*A>
      32  13CA                  .BYTE   ^062
   0348'  13CB                  .WORD   <LS_SETPARERR-HEAD>
          13CD  3612                    CALL    SET_PAR_INT             ;SET UP PARITY ERROR IN SPECIFIED
      CD  13CD                  .BYTE   ^0315
   16C7'  13CE                  .WORD   <SET_PAR_INT-HEAD>              ; WCS LOCATION
          13D0  3613
          13D0  3614                    ENDIF
          13D0       2068$:                                             ;GENERATE LCL 2068 NAME
          13D0  3615
          13D0  3616                    IFMBI   COMMAND2,MM_SIZE        ;BIT 11 = PRINT MM SIZE
      3A  13D0                  .BYTE   ^072
   00B1'  13D1                  .WORD   <COMMAND2-HEAD>
      E6  13D3                  .BYTE   ^0346
      08  13D4                  .BYTE   MM_SIZE
      CA  13D5                  .BYTE   ^0312
   13D8'  13D6                  .WORD   <2069$-HEAD>
          13D8  3617                    ENDIF
          13D8       2069$:                                             ;GENERATE LCL 2069 NAME
          13D8  3618
          13D8  3619                    IFMBI   COMMAND2,FPA_PRES       ;BIT 12 = PRINT FPA PRESENT
      3A  13D8                  .BYTE   ^072
   00B1'  13D9                  .WORD   <COMMAND2-HEAD>
      E6  13DB                  .BYTE   ^0346
      10  13DC                  .BYTE   FPA_PRES
      CA  13DD                  .BYTE   ^0312
   13E3'  13DE                  .WORD   <2070$-HEAD>
          13E0  3620                    CALL    PRINT_MOD_PRES          ;PRINT PRESENT OR NOT PRESENT
      CD  13E0                  .BYTE   ^0315
   1723'  13E1                  .WORD   <PRINT_MOD_PRES-HEAD>
          13E3  3621                    ENDIF
          13E3       2070$:                                             ;GENERATE LCL 2070 NAME
          13E3  3622
          13E3  3623                    IFMBI   COMMAND2,XFER           ;BIT 13 = DATA TRANSFER REQ
      3A  13E3                  .BYTE   ^072
   00B1'  13E4                  .WORD   <COMMAND2-HEAD>
      E6  13E6                  .BYTE   ^0346
      20  13E7                  .BYTE   XFER
      CA  13E8                  .BYTE   ^0312
   13EE'  13E9                  .WORD   <2071$-HEAD>
          13EB  3624                    CALL    DATA_XFER
      CD  13EB                  .BYTE   ^0315
   1996'  13EC                  .WORD   <DATA_XFER-HEAD>
          13EE  3625                    ENDIF
          13EE       2071$:                                             ;GENERATE LCL 2071 NAME
          13EE  3626
          13EE  3627                    IFMBI   COMMAND2,EOS            ;BIT 14 = END OF SECTION
      3A  13EE                  .BYTE   ^072
   00B1'  13EF                  .WORD   <COMMAND2-HEAD>
      E6  13F1                  .BYTE   ^0346
      40  13F2                  .BYTE   EOS
      CA  13F3                  .BYTE   ^0312
   13FB'  13F4                  .WORD   <2072$-HEAD>
          13F6  3628                    SET     EOS_FLG
      AF  13F6                  .BYTE   ^0250 ! A               ;with A
      3C  13F7                  .BYTE   ^04 ! <8*A>
      32  13F8                  .BYTE   ^062
   0056'  13F9                  .WORD   <EOS_FLG-HEAD>
```

```
         13FB  3629                  ENDIF
         13FB        2072$:                                         ;GENERATE LCL 2072 NAME
         13FB  3630
         13FB  3631                  IFMBI   COMMAND2,BEG_TST       ;BIT 15 = BEGINING OF TEST
   3A    13FB             .BYTE      ^072
00B1'    13FC             .WORD      <COMMAND2-HEAD>
   E6    13FE             .BYTE      ^0346
   80    13FF             .BYTE      BEG_TST
   CA    1400             .BYTE      ^0312
1406'    1401             .WORD      <2073$-HEAD>
         1403  3632                  CALL    BEGIN_OF_TEST
   CD    1403             .BYTE      ^0315
1881'    1404             .WORD      <BEGIN_OF_TEST-HEAD>
         1406  3633                  ENDIF
         1406        2073$:                                         ;GENERATE LCL 2073 NAME
         1406  3634
         1406  3635                  IFMBI   COMMAND1,SIGNAL        ;BIT 16 = SET UP OF SIGNAL AS
   3A    1406             .BYTE      ^072
00B0'    1407             .WORD      <COMMAND1-HEAD>
   E6    1409             .BYTE      ^0346
   01    140A             .BYTE      SIGNAL
   CA    140B             .BYTE      ^0312
1411'    140C             .WORD      <2074$-HEAD>
         140E  3636                  CALL    SET_SIGNALS
   CD    140E             .BYTE      ^0315
1760'    140F             .WORD      <SET_SIGNALS-HEAD>
         1411  3637                  ENDIF
         1411        2074$:                                         ;GENERATE LCL 2074 NAME
         1411  3638
         1411  3639                  IFMBI   COMMAND0,LOOPING       ;SPECIAL CPU LOOPING CONTROL
   3A    1411             .BYTE      ^072
00AF'    1412             .WORD      <COMMAND0-HEAD>
   E6    1414             .BYTE      ^0346
   02    1415             .BYTE      LOOPING
   CA    1416             .BYTE      ^0312
141C'    1417             .WORD      <2075$-HEAD>
         1419  3640                  CALL    LOOPER
   CD    1419             .BYTE      ^0315
17DF'    141A             .WORD      <LOOPER-HEAD>
         141C  3641                  ENDIF
         141C        2075$:                                         ;GENERATE LCL 2075 NAME
         141C  3642
         141C  3643                  IFMBI   COMMAND0,SINGLE_ERR    ;BIT 26 = PRINT SINGLE BIT ERR
   3A    141C             .BYTE      ^072
00AF'    141D             .WORD      <COMMAND0-HEAD>
   E6    141F             .BYTE      ^0346
   04    1420             .BYTE      SINGLE_ERR
   CA    1421             .BYTE      ^0312
1427'    1422             .WORD      <2076$-HEAD>
         1424  3644                  CALL    PRINT_SINGLE
   CD    1424             .BYTE      ^0315
16EA'    1425             .WORD      <PRINT_SINGLE-HEAD>
         1427  3645                  ENDIF
         1427        2076$:                                         ;GENERATE LCL 2076 NAME
         1427  3646
         1427  3647                  IFMBI   COMMAND0,CLEARPAR_ERR  ;BIT 27 = CLEAR PARITY ERROR
   3A    1427             .BYTE      ^072
```

```
  00AF' 1428               .WORD    <COMMANDO-HEAD>
     E6 142A               .BYTE    ^0346
     08 142B               .BYTE    CLEARPAR_ERR
     CA 142C               .BYTE    ^0312
  1436' 142D               .WORD    <2077$-HEAD>
        142F                        CLEAR   LS_SETPARERR            ;CLEAR LS SET PARITY ERROR FLG
     AF 142F               .BYTE    ^0250 ! A                ;with A
     32 1430               .BYTE    ^062
  0348' 1431               .WORD    <LS_SETPARERR-HEAD>
        1433                        CALL     CLEAR_PAR_INT          ;RESTORE GOOD PARITY AT ADDRESS
     CD 1433               .BYTE    ^0315
  16D9' 1434               .WORD    <CLEAR_PAR_INT-HEAD>
        1436                                                        ; SPECIFIED IN LS 7
        1436                        ENDIF
        1436      2077$:                                            ;GENERATE LCL 2077 NAME
        1436
        1436                        IFMBI   COMMANDO,IDC_PRES       ;BIT 31 = PRINT IDC PRESENT
     3A 1436               .BYTE    ^072
  00AF' 1437               .WORD    <COMMANDO-HEAD>
     E6 1439               .BYTE    ^0346
     80 143A               .BYTE    IDC_PRES
     CA 143B               .BYTE    ^0312
  1441' 143C               .WORD    <2078$-HEAD>
        143E                        CALL     PRINT_MOD_PRES_IDC
     CD 143E               .BYTE    ^0315
  1742' 143F               .WORD    <PRINT_MOD_PRES_IDC-HEAD>
        1441                        ENDIF
        1441      2078$:                                            ;GENERATE LCL 2078 NAME
        1441
        1441                        RET
     C9 1441               .BYTE    ^0311
        1442
        1442
        1442
        1442      ;*********************************************************************************
        1442      ;
        1442      ;  WCS_ERROR
        1442      ;  THIS ROUTINE IS EXECUTED WHEN THE COMMAND AND STATUS WORD INDICATES
        1442      ;  THAT THERE HAS BEEN AN ERROR.  IF BELL IS SET THE BELL IS RUNG
        1442      ;  IT ALSO DECODES THE MODULES NAME FROM THE BITS AS FOLLOWS
        1442      ;
        1442      ;          BIT 0 - WCS M8395
        1442      ;              1 - CPU M8390
        1442      ;              2 - MCT M8391
        1442      ;              3 - FPA M8389
        1442      ;              4 - MEMORY ARRAY CARD
        1442      ;              5 - IDC M8388
        1442      ;
        1442      ;  THIS ROUTINE IS ALSO USED BY THE 8085 BASED TESTS.  IN THAT CASE, THE
        1442      ;  CONSOLE_TEST FLAG IS SET AND SOME DIFFERENT BRANCHES ARE TAKEN.
        1442      ;
        1442      ;*********************************************************************************
        1442
        1442      WCS_ERROR:
        1442                        LXI     H,FAIL_A                ;PRINT *FAIL* MESSAGE
     21 1442               .BYTE    <H*8> ! 1
 02'EF' 1443               .BYTE    <FAIL_A-HEAD>&255 , <<FAIL_A-HEAD>&^XFF00>/256
```

```
             1445  3682                  CALL    PRINT_STRING_R
        CD   1445              .BYTE     ^0315
     100E'   1446              .WORD     <PRINT_STRING_R-HEAD>
             1448  3683
             1448  3684                  CALL    CRLF_R
        CD   1448              .BYTE     ^0315
     101A'   1449              .WORD     <CRLF_R-HEAD>
             144B  3685                  LXI     H,ABORT_A                     ;PRINT ABORT MESSAGE
        21   144B              .BYTE     <H*8> ! 1
    01'64'   144C              .BYTE     <ABORT_A-HEAD>&255 , <<ABORT_A-HEAD>&^XFF00>/256
             144E  3686                  CALL    PRINT_STRING_R
        CD   144E              .BYTE     ^0315
     100E'   144F              .WORD     <PRINT_STRING_R-HEAD>
             1451  3687
             1451  3688                  IFN     CONSOLE_TEST                  ;GET VALUES FROM LS IF NOT
        3A   1451              .BYTE     ^072
     0255'   1452              .WORD     <CONSOLE_TEST-HEAD>
        0F   1454              .BYTE     ^017
        DA   1455              .BYTE     ^0332
     14B1'   1456              .WORD     <2079$-HEAD>
                                                                               ; 8085 BASED CONSOLE TEST
             1458  3689
             1458  3690                  MVI     A,WCS_ERR_NUM                 ;GET ERROR NUMBER FROM LS
     41 3E   1458              .BYTE     <A*8> ! 6 , WCS_ERR_NUM&255
             145A  3691                  CALL    READ_LS_R
        CD   145A              .BYTE     ^0315
     1167'   145B              .WORD     <READ_LS_R-HEAD>
             145D  3692                  LDA     DATA3
        3A   145D              .BYTE     ^072
     00AC'   145E              .WORD     <DATA3-HEAD>
             1460  3693                  STA     CON_ERR_NUM                   ;STORE IN MEM
        32   1460              .BYTE     ^062
     003F'   1461              .WORD     <CON_ERR_NUM-HEAD>
             1463  3694
             1463  3695                  MVI     A,WCS_EXP_DAT                 ;GET EXPECTED VALUE FROM LS
     42 3E   1463              .BYTE     <A*8> ! 6 , WCS_EXP_DAT&255
             1465  3696                  CALL    READ_LS_R
        CD   1465              .BYTE     ^0315
     1167'   1466              .WORD     <READ_LS_R-HEAD>
             1468  3697                  LXI     D,CON_EXP_DAT                 ;DESTINATION
        11   1468              .BYTE     <D*8> ! 1
    00'40'   1469              .BYTE     <CON_EXP_DAT-HEAD>&255 , <<CON_EXP_DAT-HEAD>&^XFF00>/256
             146B  3698                  CALL    MOV_FROM_DATA0                ;MOVE 4 BYTES OF DATA FROM
        CD   146B              .BYTE     ^0315
     0F70'   146C              .WORD     <MOV_FROM_DATA0-HEAD>
             146E  3699                                                        ; DATA0
             146E  3700
             146E  3701                  MVI     A,WCS_REC_DAT                 ;GET RECEIVED VALUE FROM LS
     43 3E   146E              .BYTE     <A*8> ! 6 , WCS_REC_DAT&255
             1470  3702                  CALL    READ_LS_R
        CD   1470              .BYTE     ^0315
     1167'   1471              .WORD     <READ_LS_R-HEAD>
             1473  3703                  LXI     D,CON_REC_DAT                 ;DESTINATION
        11   1473              .BYTE     <D*8> ! 1
    00'4F'   1474              .BYTE     <CON_REC_DAT-HEAD>&255 , <<CON_REC_DAT-HEAD>&^XFF00>/256
             1476  3704                  CALL    MOV_FROM_DATA0                ;MOVE 4 BYTES OF DATA FROM
        CD   1476              .BYTE     ^0315
     0F70'   1477              .WORD     <MOV_FROM_DATA0-HEAD>
```

```
                 1479  3705                                                      ; DATA0
                 1479  3706
                 1479  3707                      MVI     A,WCS_ADDR_DAT          ;GET OTHER DATA FROM LS
          44 3E  1479               .BYTE        <A*8> ! 6 , WCS_ADDR_DAT&255
                 147B  3708                      CALL    READ_LS_R
             CD  147B               .BYTE        ^0315
          1167'  147C               .WORD        <READ_LS_R-HEAD>
                 147E  3709                      LXI     D,CON_ADD_DAT           ;DESTINATION
             11  147E               .BYTE        <D*8> ! 1
        00'3B'   147F               .BYTE        <CON_ADD_DAT-HEAD>&255 , <<CON_ADD_DAT-HEAD>&^XFF00>/256
                 1481  3710                      CALL    MOV_FROM_DATA0          ;MOVE 4 BYTES OF DATA FROM
             CD  1481               .BYTE        ^0315
          0F70'  1482               .WORD        <MOV_FROM_DATA0-HEAD>
                 1484  3711                                                      ; DATA0
                 1484  3712
                 1484  3713                      MVI     A,WCS_MSK_DAT           ;GET ERROR MASK FROM LS
          45 3E  1484               .BYTE        <A*8> ! 6 , WCS_MSK_DAT&255
                 1486  3714                      CALL    READ_LS_R
             CD  1486               .BYTE        ^0315
          1167'  1487               .WORD        <READ_LS_R-HEAD>
                 1489  3715                      LXI     D,CON_MSK_DAT           ;DESTINATION
             11  1489               .BYTE        <D*8> ! 1
        00'4B'   148A               .BYTE        <CON_MSK_DAT-HEAD>&255 , <<CON_MSK_DAT-HEAD>&^XFF00>/256
                 148C  3716                      CALL    MOV_FROM_DATA0          ;MOVE 4 BYTES OF DATA FROM
             CD  148C               .BYTE        ^0315
          0F70'  148D               .WORD        <MOV_FROM_DATA0-HEAD>
                 148F  3717                                                      ; DATA0
                 148F  3718
                 148F  3719                      CLEAR   NA_EXP_REC
             AF  148F               .BYTE        ^0250 ! A               ;with A
             32  1490               .BYTE        ^062
          005F'  1491               .WORD        <NA_EXP_REC-HEAD>
                 1493  3720                      IFMBI   COMMAND1,NA             ;SEE IF EXP AND REC ARE N/A
             3A  1493               .BYTE        ^072
          00B0'  1494               .WORD        <COMMAND1-HEAD>
             E6  1496               .BYTE        ^0346
             80  1497               .BYTE        NA
             CA  1498               .BYTE        ^0312
          14A0'  1499               .WORD        <2080$-HEAD>
                 149B  3721                      SET     NA_EXP_REC              ;SET FLAG IF SO
             AF  149B               .BYTE        ^0250 ! A               ;with A
             3C  149C               .BYTE        ^04 ! <8*A>
             32  149D               .BYTE        ^062
          005F'  149E               .WORD        <NA_EXP_REC-HEAD>
                 14A0  3722                      ENDIF
                 14A0        2080$:                                              ;GENERATE LCL 2080 NAME
                 14A0  3723
                 14A0  3724                      SET     NA_OTHER
             AF  14A0               .BYTE        ^0250 ! A               ;with A
             3C  14A1               .BYTE        ^04 ! <8*A>
             32  14A2               .BYTE        ^062
          0060'  14A3               .WORD        <NA_OTHER-HEAD>
                 14A5  3725                      IFMBI   COMMAND0,ADDR           ;SEE IF OTHER DATA IS N/A
             3A  14A5               .BYTE        ^072
          00AF'  14A6               .WORD        <COMMAND0-HEAD>
             E6  14A8               .BYTE        ^0346
             01  14A9               .BYTE        ADDR
```

```
      CA  14AA                 .BYTE   ^0312
   14B1'  14AB                 .WORD   <2081$-HEAD>
          14AD  3726                   CLEAR   NA_OTHER                       ;CLEAR FLAG IF NOT N/A
      AF  14AD                 .BYTE   ^0250 ! A               ;with A
      32  14AE                 .BYTE   ^062
   0060'  14AF                 .WORD   <NA_OTHER-HEAD>
          14B1  3727                   ENDIF
          14B1        2081$:                                                  ;GENERATE LCL 2081 NAME
          14B1  3728
          14B1  3729                   ENDIF
          14B1        2079$:                                                  ;GENERATE LCL 2079 NAME
          14B1  3730
          14B1  3731                   IF      CONSOLE_TEST                   ;CALL OUT FAILING OPTION
      3A  14B1                 .BYTE   ^072
   0255'  14B2                 .WORD   <CONSOLE_TEST-HEAD>
      0F  14B4                 .BYTE   ^017
      D2  14B5                 .BYTE   ^0322
   14C1'  14B6                 .WORD   <2082$-HEAD>
          14B8  3732
          14B8  3733                   LXI     H,CPU_A                        ;IF 8085 BASED CONSOLE TEST
      21  14B8                 .BYTE   <H*8> ! 1
 02'57'   14B9                 .BYTE   <CPU_A-HEAD>&255 , <<CPU_A-HEAD>&^XFF00>/256
          14BB  3734                   CALL    PRINT_STRING_R                 ; THEN CALL OUT CPU BAD
      CD  14BB                 .BYTE   ^0315
   100E'  14BC                 .WORD   <PRINT_STRING_R-HEAD>
          14BE  3735
          14BE  3736                   ELSE                                   ;FOR WCS BASED TESTS
      C3  14BE                 .BYTE   ^0303
   1541'  14BF                 .WORD   <2083$-HEAD>
          14C1        2082$:                                                  ;GENERATE LOCAL SYMBOL NAME
          14C1  3737
          14C1  3738                   MVI     A,WCS_MOD_DAT                  ;READ MODULE DATA FROM LS
   46 3E  14C1                 .BYTE   <A*8> ! 6 , WCS_MOD_DAT&255
          14C3  3739                   CALL    READ_LS_R
      CD  14C3                 .BYTE   ^0315
   1167'  14C4                 .WORD   <READ_LS_R-HEAD>
          14C6  3740                   LDA     DATA3
      3A  14C6                 .BYTE   ^072
   00AC'  14C7                 .WORD   <DATA3-HEAD>
          14C9  3741                   STA     TEMP_BYTE                      ;STORE MODULE DATA
      32  14C9                 .BYTE   ^062
   0418'  14CA                 .WORD   <TEMP_BYTE-HEAD>
          14CC  3742                   LXI     H,CRD_OPT_A                    ;POINT TO OPTION CALL OUT TABLE
      21  14CC                 .BYTE   <H*8> ! 1
 08'25'   14CD                 .BYTE   <CRD_OPT_A-HEAD>&255 , <<CRD_OPT_A-HEAD>&^XFF00>/256
          14CF  3743                   SHLD    TEMP_WORD                      ;STORE THE POINTER
      22  14CF                 .BYTE   ^042
   0419'  14D0                 .WORD   <TEMP_WORD-HEAD>
          14D2  3744                   CLEAR   MOD_ERR
      AF  14D2                 .BYTE   ^0250 ! A               ;with A
      32  14D3                 .BYTE   ^062
   0395'  14D4                 .WORD   <MOD_ERR-HEAD>
          14D6  3745
          14D6  3746                   DO      3                              ;FIRST 3 BITS CALL OUT CPU
      21  14D6                 .BYTE   <H*8> ! 1
 00'55'   14D7                 .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
      46  14D9                 .BYTE   ^0100 ! <B*8> ! M
```

```
       C5  14DA              .BYTE   ^0305 ! <8*B>
    03 3E  14DB              .BYTE   <A*8> ! 6 , 3&255
       77  14DD              .BYTE   ^0100 ! <M*8> ! A
           14DE       2084$:
           14DE  3747
           14DE  3748                LDA     TEMP_BYTE              ;CHECK FOR BIT SET
       3A  14DE              .BYTE   ^072
    0418'  14DF              .WORD   <TEMP_BYTE-HEAD>
           14E1  3749                RRC
       0F  14E1              .BYTE   ^017
           14E2  3750                STA     TEMP_BYTE
       32  14E2              .BYTE   ^062
    0418'  14E3              .WORD   <TEMP_BYTE-HEAD>
           14E5  3751
           14E5  3752                IFC
       D2  14E5              .BYTE   ^0322
    14FA'  14E6              .WORD   <2085$-HEAD>
           14E8  3753
           14E8  3754                IFN     MOD_ERR                ;CALL OUT BAD CPU
       3A  14E8              .BYTE   ^072
    0395'  14E9              .WORD   <MOD_ERR-HEAD>
       0F  14EB              .BYTE   ^017
       DA  14EC              .BYTE   ^0332
    14F5'  14ED              .WORD   <2086$-HEAD>
           14EF  3755                LXI     H,CPU_A                ;IF WE HAVEN'T ALREADY DONE SO
       21  14EF              .BYTE   <H*8> ! 1
  02'57'   14F0              .BYTE   <CPU_A-HEAD>&255 , <<CPU_A-HEAD>&^XFF00>/256
           14F2  3756                CALL    PRINT_STRING_R
       CD  14F2              .BYTE   ^0315
    100E'  14F3              .WORD   <PRINT_STRING_R-HEAD>
           14F5  3757                ENDIF
           14F5       2086$:                                        ;GENERATE LCL 2086 NAME
           14F5  3758
           14F5  3759                SET     MOD_ERR                ;AT LEAST 1 CPU MODULE IS BAD
       AF  14F5              .BYTE   ^0250 ! A            ;with A
       3C  14F6              .BYTE   ^04 ! <8*A>
       32  14F7              .BYTE   ^062
    0395'  14F8              .WORD   <MOD_ERR-HEAD>
           14FA  3760
           14FA  3761                ENDIF                          ;GENERATE LCL 2085 NAME
           14FA       2085$:
           14FA  3762                ENDDO
       21  14FA              .BYTE   <H*8> ! 1
  00'55'   14FB              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       35  14FD              .BYTE   ^05 ! <8*M>
       C2  14FE              .BYTE   ^0302
    14DE'  14FF              .WORD   <2084$-HEAD>
       C1  1501              .BYTE   ^0301 ! <8*B>
       70  1502              .BYTE   ^0100 ! <M*8> ! B
           1503  3763
           1503  3764                DO      5                      ;EXAMINE REMAINING BITS
       21  1503              .BYTE   <H*8> ! 1
  00'55'   1504              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       46  1506              .BYTE   ^0100 ! <B*8> ! M
       C5  1507              .BYTE   ^0305 ! <8*B>
    05 3E  1508              .BYTE   <A*8> ! 6 , 5&255
       77  150A              .BYTE   ^0100 ! <M*8> ! A
```

```
                150B       2087$:
                150B  3765
                150B  3766                  LDA     TEMP_BYTE                       ;CHECK FOR BIT SET
          3A    150B                .BYTE   ^072
       0418'    150C                .WORD   <TEMP_BYTE-HEAD>
                150E  3767                  RRC
          0F    150E                .BYTE   ^017
                150F  3768                  STA     TEMP_BYTE
          32    150F                .BYTE   ^062
       0418'    1510                .WORD   <TEMP_BYTE-HEAD>
                1512  3769
                1512  3770                  IFC
          D2    1512                .BYTE   ^0322
       152D'    1513                .WORD   <2088$-HEAD>
                1515  3771
                1515  3772                  IF      MOD_ERR                         ;PRINT 'OR' IF OTHER MODULES
          3A    1515                .BYTE   ^072
       0395'    1516                .WORD   <MOD_ERR-HEAD>
          0F    1518                .BYTE   ^017
          D2    1519                .BYTE   ^0322
       1522'    151A                .WORD   <2089$-HEAD>
                151C  3773                  LXI     H,OR_A                          ;HAVE ALREADY BEEN CALLED OUT
          21    151C                .BYTE   <H*8> ! 1
      03'D0'    151D                .BYTE   <OR_A-HEAD>&255 , <<OR_A-HEAD>&^XFF00>/256
                151F  3774                  CALL    PRINT_STRING_R
          CD    151F                .BYTE   ^0315
       100E'    1520                .WORD   <PRINT_STRING_R-HEAD>
                1522  3775                  ENDIF
                1522       2089$:                                                   ;GENERATE LCL 2089 NAME
                1522  3776
                1522  3777                  LHLD    TEMP_WORD                       ;PRINT OUT MODULE NAME
          2A    1522                .BYTE   ^052
       0419'    1523                .WORD   <TEMP_WORD-HEAD>
                1525  3778                  CALL    PRINT_STRING_R
          CD    1525                .BYTE   ^0315
       100E'    1526                .WORD   <PRINT_STRING_R-HEAD>
                1528  3779                  SET     MOD_ERR
          AF    1528                .BYTE   ^0250 ! A               ;with A
          3C    1529                .BYTE   ^04 ! <8*A>
          32    152A                .BYTE   ^062
       0395'    152B                .WORD   <MOD_ERR-HEAD>
                152D  3780
                152D  3781                  ENDIF
                152D       2088$:                                                   ;GENERATE LCL 2088 NAME
                152D  3782
                152D  3783                  MVI     B,0                             ;INCREMENT TO POINT TO NEXT
       00 06    152D                .BYTE   <B*8> ! 6 , 0&255
                152F  3784                  MVI     C,7                             ; MODULE NAME
       07 0E    152F                .BYTE   <C*8> ! 6 , 7&255
                1531  3785                  LHLD    TEMP_WORD
          2A    1531                .BYTE   ^052
       0419'    1532                .WORD   <TEMP_WORD-HEAD>
                1534  3786                  DAD     B
          09    1534                .BYTE   <B*8> ! 9
                1535  3787                  SHLD    TEMP_WORD
          22    1535                .BYTE   ^042
       0419'    1536                .WORD   <TEMP_WORD-HEAD>
```

```
                1538  3788
                1538  3789                   ENDDO
          21    1538              .BYTE      <H*8> ! 1
      00'55'    1539              .BYTE      <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
          35    153B              .BYTE      ^05 ! <8*M>
          C2    153C              .BYTE      ^0302
       150B'    153D              .WORD      <2087$-HEAD>
          C1    153F              .BYTE      ^0301 ! <8*B>
          70    1540              .BYTE      ^0100 ! <M*8> ! B
                1541  3790
                1541  3791                   ENDIF
                1541        2083$:                                             ;GENERATE LCL 2083 NAME
                1541  3792
                1541  3793                   LXI     H,BAD_A                   ;PRINT 'BAD'
          21    1541              .BYTE      <H*8> ! 1
      01'7E'    1542              .BYTE      <BAD_A-HEAD>&255 , <<BAD_A-HEAD>&^XFF00>/256
                1544  3794                   CALL    PRINT_STRING_R
          CD    1544              .BYTE      ^0315
       100E'    1545              .WORD      <PRINT_STRING_R-HEAD>
                1547  3795
                1547  3796                   JMP     MENU                      ;WHAT TO DO FROM HERE?
          C3    1547              .BYTE      ^0303
       1616'    1548              .WORD      <MENU-HEAD>
                154A  3797
                154A  3798 ;****************************************************************************
                154A  3799 ;
                154A  3800 ;  FULL_ERROR
                154A  3801 ;  THIS ROUTINE PRINTS OUT THE FULL ERROR REPORT IF THAT OPTION IS DESIRED.
                154A  3802 ;
                154A  3803 ;****************************************************************************
                154A  3804
                154A  3805 FULL_ERROR:        LXI     H,HEADER_A                ;PRINT HEADER LINE FOR ERROR
          21    154A              .BYTE      <H*8> ! 1
      03'02'    154B              .BYTE      <HEADER_A-HEAD>&255 , <<HEADER_A-HEAD>&^XFF00>/256
                154D  3806                   CALL    PRINT_STRING_R
          CD    154D              .BYTE      ^0315
       100E'    154E              .WORD      <PRINT_STRING_R-HEAD>
                1550  3807
                1550  3808                   LXI     H,SECTION_NAME            ;PRINT SECTION NAME LOADED
          21    1550              .BYTE      <H*8> ! 1
      08'CA'    1551              .BYTE      <SECTION_NAME-HEAD>&255 , <<SECTION_NAME-HEAD>&^XFF00>/256
                1553  3809                   MVI     C,SEC_LEN
       06 0E    1553              .BYTE      <C*8> ! 6 , SEC_LEN&255
                1555  3810                   CALL    PRINTER
          CD    1555              .BYTE      ^0315
       1007'    1556              .WORD      <PRINTER-HEAD>
                1558  3811
                1558  3812                   CALL    SPACE_R
          CD    1558              .BYTE      ^0315
       1021'    1559              .WORD      <SPACE_R-HEAD>
                155B  3813
                155B  3814                   LDA     TEST_NUM                  ;PRINT TEST NUMBER
          3A    155B              .BYTE      ^072
       0426'    155C              .WORD      <TEST_NUM-HEAD>
                155E  3815                   STA     HEX_BUF
          32    155E              .BYTE      ^062
       005B'    155F              .WORD      <HEX_BUF-HEAD>
```

```
                1561  3816                          CALL    PRINT_HEX_1_R
            CD  1561                 .BYTE          ^0315
         0F94'  1562                 .WORD          <PRINT_HEX_1_R-HEAD>
                1564  3817                          CALL    SPACE_R
            CD  1564                 .BYTE          ^0315
         1021'  1565                 .WORD          <SPACE_R-HEAD>
                1567  3818
                1567  3819                          LDA     CON_ERR_NUM             ;ERROR NUMBER LOADED PREVIOUSLY
            3A  1567                 .BYTE          ^072
         003F'  1568                 .WORD          <CON_ERR_NUM-HEAD>
                156A  3820                          STA     HEX_BUF
            32  156A                 .BYTE          ^062
         005B'  156B                 .WORD          <HEX_BUF-HEAD>
                156D  3821                          CALL    PRINT_HEX_1_R           ;PRINT ERROR NUMBER
            CD  156D                 .BYTE          ^0315
         0F94'  156E                 .WORD          <PRINT_HEX_1_R-HEAD>
                1570  3822                          CALL    SPACE_R
            CD  1570                 .BYTE          ^0315
         1021'  1571                 .WORD          <SPACE_R-HEAD>
                1573  3823
                1573  3824                          IF      NA_EXP_REC              ;IF EXPECTED AND RECEIVED DATA
            3A  1573                 .BYTE          ^072
         005F'  1574                 .WORD          <NA_EXP_REC-HEAD>
            0F  1576                 .BYTE          ^017
            D2  1577                 .BYTE          ^0322
         1589'  1578                 .WORD          <2090$-HEAD>
                157A  3825                                                          ; ARE NOT APPLICABLE
                157A  3826                          LXI     H,NA_A                  ;POINT TO ASCII N/A
            21  157A                 .BYTE          <H*8> ! 1
       03'B0'   157B                 .BYTE          <NA_A-HEAD>&255 , <<NA_A-HEAD>&^XFF00>/256
                157D  3827                          CALL    PRINT_STRING_R          ;PRINT UNDER EXPECTED DATA
            CD  157D                 .BYTE          ^0315
         100E'  157E                 .WORD          <PRINT_STRING_R-HEAD>
                1580  3828                          LXI     H,NA_A                  ;POINT TO ASCII N/A
            21  1580                 .BYTE          <H*8> ! 1
       03'B0'   1581                 .BYTE          <NA_A-HEAD>&255 , <<NA_A-HEAD>&^XFF00>/256
                1583  3829                          CALL    PRINT_STRING_R          ;PRINT UNDER RECEIVED DATA
            CD  1583                 .BYTE          ^0315
         100E'  1584                 .WORD          <PRINT_STRING_R-HEAD>
                1586  3830
                1586  3831                          ELSE
            C3  1586                 .BYTE          ^0303
         15A1'  1587                 .WORD          <2091$-HEAD>
                1589        2090$:                                                  ;GENERATE LOCAL SYMBOL NAME
                1589  3832
                1589  3833                          LXI     H,CON_EXP_DAT           ;POINT TO EXPECTED DATA
            21  1589                 .BYTE          <H*8> ! 1
       00'40'   158A                 .BYTE          <CON_EXP_DAT-HEAD>&255 , <<CON_EXP_DAT-HEAD>&^XFF00>/256
                158C  3834                          LXI     D,HEX_BUF
            11  158C                 .BYTE          <D*8> ! 1
       00'5B'   158D                 .BYTE          <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
                158F  3835                          CALL    MOVER_4_R
            CD  158F                 .BYTE          ^0315
         0F73'  1590                 .WORD          <MOVER_4_R-HEAD>
                1592  3836                          CALL    PRINT_HEX_4             ;PRINT EXPECTED DATA
            CD  1592                 .BYTE          ^0315
         0F8A'  1593                 .WORD          <PRINT_HEX_4-HEAD>
```

```
                1595  3837
                1595  3838                      LXI     H,CON_REC_DAT             ;POINT TO RECEIVED DATA
          21    1595                .BYTE       <H*8> ! 1
      00'4F'    1596                .BYTE       <CON_REC_DAT-HEAD>&255 , <<CON_REC_DAT-HEAD>&^XFF00>/256
                1598  3839                      LXI     D,HEX_BUF
          11    1598                .BYTE       <D*8> ! 1
      00'5B'    1599                .BYTE       <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
                159B  3840                      CALL    MOVER_4_R
          CD    159B                .BYTE       ^0315
       0F73'    159C                .WORD       <MOVER_4_R-HEAD>
                159E  3841                      CALL    PRINT_HEX_4               ;PRINT RECEIVED DATA
          CD    159E                .BYTE       ^0315
       0F8A'    159F                .WORD       <PRINT_HEX_4-HEAD>
                15A1  3842
                15A1  3843                      ENDIF
                15A1        2091$:                                                ;GENERATE LCL 2091 NAME
                15A1  3844
                15A1  3845                      IF      NA_OTHER                  ;IF OTHER DATA IS NOT
          3A    15A1                .BYTE       ^072
       0060'    15A2                .WORD       <NA_OTHER-HEAD>
          0F    15A4                .BYTE       ^017
          D2    15A5                .BYTE       ^0322
       15B1'    15A6                .WORD       <2092$-HEAD>
                15A8  3846                                                        ; APPLICABLE
                15A8  3847                      LXI     H,NA_A                    ;POINT TO ASCII N/A
          21    15A8                .BYTE       <H*8> ! 1
      03'B0'    15A9                .BYTE       <NA_A-HEAD>&255 , <<NA_A-HEAD>&^XFF00>/256
                15AB  3848                      CALL    PRINT_STRING_R            ;PRINT UNDER OTHER DATA
          CD    15AB                .BYTE       ^0315
       100E'    15AC                .WORD       <PRINT_STRING_R-HEAD>
                15AE  3849
                15AE  3850                      ELSE
          C3    15AE                .BYTE       ^0303
       15BD'    15AF                .WORD       <2093$-HEAD>
                15B1        2092$:                                                ;GENERATE LOCAL SYMBOL NAME
                15B1  3851                      LXI     H,CON_ADD_DAT             ;POINT TO OTHER DATA
          21    15B1                .BYTE       <H*8> ! 1
      00'3B'    15B2                .BYTE       <CON_ADD_DAT-HEAD>&255 , <<CON_ADD_DAT-HEAD>&^XFF00>/256
                15B4  3852                      LXI     D,HEX_BUF
          11    15B4                .BYTE       <D*8> ! 1
      00'5B'    15B5                .BYTE       <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
                15B7  3853                      CALL    MOVER_4_R
          CD    15B7                .BYTE       ^0315
       0F73'    15B8                .WORD       <MOVER_4_R-HEAD>
                15BA  3854                      CALL    PRINT_HEX_4               ;PRINT OTHER DATA
          CD    15BA                .BYTE       ^0315
       0F8A'    15BB                .WORD       <PRINT_HEX_4-HEAD>
                15BD  3855                      ENDIF
                15BD        2093$:                                                ;GENERATE LCL 2093 NAME
                15BD  3856
                15BD  3857                      LXI     H,CON_MSK_DAT             ;POINT TO ERROR MASK
          21    15BD                .BYTE       <H*8> ! 1
      00'4B'    15BE                .BYTE       <CON_MSK_DAT-HEAD>&255 , <<CON_MSK_DAT-HEAD>&^XFF00>/256
                15C0  3858                      LXI     D,HEX_BUF
          11    15C0                .BYTE       <D*8> ! 1
      00'5B'    15C1                .BYTE       <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
                15C3  3859                      CALL    MOVER_4_R
```

```
     CD  15C3                .BYTE    ^0315
  0F73'  15C4                .WORD    <MOVER_4_R-HEAD>
         15C6   3860                  CALL     PRINT_HEX_4              ;PRINT ERROR MASK
     CD  15C6                .BYTE    ^0315
  0F8A'  15C7                .WORD    <PRINT_HEX_4-HEAD>
         15C9   3861
         15C9   3862                  IFN      CONSOLE_TEST
     3A  15C9                .BYTE    ^072
  0255'  15CA                .WORD    <CONSOLE_TEST-HEAD>
     0F  15CC                .BYTE    ^017
     DA  15CD                .BYTE    ^0332
  1608'  15CE                .WORD    <2094$-HEAD>
         15D0   3863
         15D0   3864                  MVI      A,WCS_MOD_DAT            ;PRINT MODULE NUMBER
  46 3E  15D0                .BYTE    <A*8> ! 6 , WCS_MOD_DAT&255
         15D2   3865                  CALL     READ_LS_R                ;READ FROM LS
     CD  15D2                .BYTE    ^0315
  1167'  15D3                .WORD    <READ_LS_R-HEAD>
         15D5   3866                  LDA      DATA3
     3A  15D5                .BYTE    ^072
  00AC'  15D6                .WORD    <DATA3-HEAD>
         15D8   3867                  STA      TEMP_BYTE
     32  15D8                .BYTE    ^062
  0418'  15D9                .WORD    <TEMP_BYTE-HEAD>
         15DB   3868                  LXI      H,PRT_MOD_A
     21  15DB                .BYTE    <H*8> ! 1
01'3B'   15DC                .BYTE    <PRT_MOD_A-HEAD>&255 , <<PRT_MOD_A-HEAD>&^XFF00>/256
         15DE   3869                  SHLD     TEMP_WORD
     22  15DE                .BYTE    ^042
  0419'  15DF                .WORD    <TEMP_WORD-HEAD>
         15E1   3870
         15E1   3871                  DO       8                        ;EIGHT POSS. MODULE NAMES
     21  15E1                .BYTE    <H*8> ! 1
00'55'   15E2                .BYTE    <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46  15E4                .BYTE    ^0100 ! <B*8> ! M
     C5  15E5                .BYTE    ^0305 ! <8*B>
  08 3E  15E6                .BYTE    <A*8> ! 6 , 8&255
     77  15E8                .BYTE    ^0100 ! <M*8> ! A
         15E9          2095$:
         15E9   3872
         15E9   3873                  LDA      TEMP_BYTE
     3A  15E9                .BYTE    ^072
  0418'  15EA                .WORD    <TEMP_BYTE-HEAD>
         15EC   3874                  RRC
     0F  15EC                .BYTE    ^017
         15ED   3875                  STA      TEMP_BYTE
     32  15ED                .BYTE    ^062
  0418'  15EE                .WORD    <TEMP_BYTE-HEAD>
         15F0   3876
         15F0   3877                  IFC
     D2  15F0                .BYTE    ^0322
  15F9'  15F1                .WORD    <2096$-HEAD>
         15F3   3878                  CALL     PRINT_FLG
     CD  15F3                .BYTE    ^0315
  0F7E'  15F4                .WORD    <PRINT_FLG-HEAD>
         15F6   3879                  CALL     SPACE_R
     CD  15F6                .BYTE    ^0315
```

```
   1021' 15F7                  .WORD   <SPACE_R-HEAD>
         15F9  3880                    ENDIF
         15F9       2096$:                                              ;GENERATE LCL 2096 NAME
         15F9  3881
         15F9  3882                    CALL     INC_TEMPW_5             ;INCREMENT TO NEXT FLAG
      CD 15F9                  .BYTE   ^0315
   12A5' 15FA                  .WORD   <INC_TEMPW_5-HEAD>
         15FC  3883
         15FC  3884                    ENDDO
      21 15FC                  .BYTE   <H*8> ! 1
  00'55' 15FD                  .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
      35 15FF                  .BYTE   ^05 ! <8*M>
      C2 1600                  .BYTE   ^0302
   15E9' 1601                  .WORD   <2095$-HEAD>
      C1 1603                  .BYTE   ^0301 ! <8*B>
      70 1604                  .BYTE   ^0100 ! <M*8> ! B
         1605  3885
         1605  3886                    ELSE                             ;IF CONSOLE TEST
      C3 1605                  .BYTE   ^0303
   1610' 1606                  .WORD   <2097$-HEAD>
         1608       2094$:                                              ;GENERATE LOCAL SYMBOL NAME
         1608  3887                    LXI      H,CON_MOD_DAT
      21 1608                  .BYTE   <H*8> ! 1
  00'46' 1609                  .BYTE   <CON_MOD_DAT-HEAD>&255 , <<CON_MOD_DAT-HEAD>&^XFF00>/256
         160B  3888                    MVI      C,5
   05 0E 160B                  .BYTE   <C*8> ! 6 , 5&255
         160D  3889                    CALL     PRINTER                 ;PRINT MODULE #
      CD 160D                  .BYTE   ^0315
   1007' 160E                  .WORD   <PRINTER-HEAD>
         1610  3890                    ENDIF
         1610       2097$:                                              ;GENERATE LCL 2097 NAME
         1610  3891
         1610  3892                    CALL     CRLF_R
      CD 1610                  .BYTE   ^0315
   101A' 1611                  .WORD   <CRLF_R-HEAD>
         1613  3893
         1613  3894                    JMP      MENU
      C3 1613                  .BYTE   ^0303
   1616' 1614                  .WORD   <MENU-HEAD>
         1616  3895
         1616  3896
         1616  3897 ;**************************************************************************
         1616  3898 ;
         1616  3899 ;  MENU
         1616  3900 ;  THIS ROUTINE PRINTS THE MENU PROMPT AFTER AN ERROR OR CONTROL_C.  IT
         1616  3901 ;  THEN TAKES THE APPROPRIATE ACTION.
         1616  3902 ;
         1616  3903 ;**************************************************************************
         1616  3904
         1616  3905 MENU:              CALL     CRLF_R
      CD 1616                  .BYTE   ^0315
   101A' 1617                  .WORD   <CRLF_R-HEAD>
         1619  3906
         1619  3907                    LXI      H,MENU_A                ;PRINT OPTIONS
      21 1619                  .BYTE   <H*8> ! 1
  03'55' 161A                  .BYTE   <MENU_A-HEAD>&255 , <<MENU_A-HEAD>&^XFF00>/256
         161C  3908                    CALL     PRINT_STRING_R
      CD  161C                  .BYTE   ^0315
   100E'  161D                  .WORD   <PRINT_STRING_R-HEAD>
          161F   3909
          161F   3910                   CALL    INPUT_LINE                 ;GET DESIRED OPTION
      CD  161F                  .BYTE   ^0315
   102E'  1620                  .WORD   <INPUT_LINE-HEAD>
          1622   3911
          1622   3912                   MVI     C,1
   01 0E  1622                  .BYTE   <C*8> ! 6 , 1&255
          1624   3913                   LXI     H,TTBUF                    ;POINT TO USER RESPONSE
      21  1624                  .BYTE   <H*8> ! 1
  08'D1'  1625                  .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1627   3914                   XCHG
      EB  1627                  .BYTE   ^0353
          1628   3915
          1628   3916                   LXI     H,ASCII_1                  ;WAS A 1 TYPED?
      21  1628                  .BYTE   <H*8> ! 1
  01'7B'  1629                  .BYTE   <ASCII_1-HEAD>&255 , <<ASCII_1-HEAD>&^XFF00>/256
          162B   3917                   CALL    COMPARE_R
      CD  162B                  .BYTE   ^0315
   0F55'  162C                  .WORD   <COMPARE_R-HEAD>
          162E   3918
          162E   3919                   IFZ                                ;IF 1 WAS TYPED
      C2  162E                  .BYTE   ^0302
   1640'  162F                  .WORD   <2098$-HEAD>
          1631   3920                   CALL    CRLF_R
      CD  1631                  .BYTE   ^0315
   101A'  1632                  .WORD   <CRLF_R-HEAD>
          1634   3921                   LXI     H,END_A
      21  1634                  .BYTE   <H*8> ! 1
  02'62'  1635                  .BYTE   <END_A-HEAD>&255 , <<END_A-HEAD>&^XFF00>/256
          1637   3922                   CALL    PRINT_STRING_R
      CD  1637                  .BYTE   ^0315
   100E'  1638                  .WORD   <PRINT_STRING_R-HEAD>
          163A   3923                   CALL    CRLF_R
      CD  163A                  .BYTE   ^0315
   101A'  163B                  .WORD   <CRLF_R-HEAD>
          163D   3924                   JMP     STNDRD_CON_COM             ;THEN GO BACK TO CONSOLE
      C3  163D                  .BYTE   ^0303
   098A'  163E                  .WORD   <STNDRD_CON_COM-HEAD>
          1640   3925                   ENDIF
          1640          2098$:                                             ;GENERATE LCL 2098 NAME
          1640   3926
          1640   3927                   LXI     H,ASCII_2
      21  1640                  .BYTE   <H*8> ! 1
  01'7C'  1641                  .BYTE   <ASCII_2-HEAD>&255 , <<ASCII_2-HEAD>&^XFF00>/256
          1643   3928                   CALL    COMPARE_R
      CD  1643                  .BYTE   ^0315
   0F55'  1644                  .WORD   <COMPARE_R-HEAD>
          1646   3929
          1646   3930                   IFZ                                ;IF 2 WAS TYPED
      C2  1646                  .BYTE   ^0302
   164C'  1647                  .WORD   <2099$-HEAD>
          1649   3931                   JMP     START_UP                   ;THEN START AUTO MODE
      C3  1649                  .BYTE   ^0303
   1CD2'  164A                  .WORD   <START_UP-HEAD>
          164C   3932                   ENDIF
```

```
                164C        2099$:                                                  ;GENERATE LCL 2099 NAME
                164C  3933
                164C  3934                          LXI     H,ASCII_3
          21    164C                    .BYTE       <H*8> ! 1
      01'7D'    164D                    .BYTE       <ASCII_3-HEAD>&255 , <<ASCII_3-HEAD>&^XFF00>/256
                164F  3935                          CALL    COMPARE_R
          CD    164F                    .BYTE       ^O315
       0F55'    1650                    .WORD       <COMPARE_R-HEAD>
                1652  3936
                1652  3937                          IFZ                             ;IF 3 WAS TYPED
          C2    1652                    .BYTE       ^O302
       1658'    1653                    .WORD       <2100$-HEAD>
                1655  3938                          JMP     FULL_ERROR              ;PRINT FULL ERROR REPORT
          C3    1655                    .BYTE       ^O303
       154A'    1656                    .WORD       <FULL_ERROR-HEAD>
                1658  3939                          ENDIF
                1658        2100$:                                                  ;GENERATE LCL 2100 NAME
                1658  3940
                1658  3941                          JMP     MENU
          C3    1658                    .BYTE       ^O303
       1616'    1659                    .WORD       <MENU-HEAD>
                165B  3942
                165B  3943
                165B  3944  ;*****************************************************************************
                165B  3945  ;
                165B  3946  ;  PACK_WARNING
                165B  3947  ;  THIS ROUTINE PRINTS THE IMPROPER RL02 SETUP WARNING MESSAGE AS DISCOVERED
                165B  3948  ;  BY THE IDC PART II DIAGNOSTIC.
                165B  3949  ;
                165B  3950  ;*****************************************************************************
                165B  3951
                165B  3952  PACK_WARNING:           CALL    CRLF_R
          CD    165B                    .BYTE       ^O315
       101A'    165C                    .WORD       <CRLF_R-HEAD>
                165E  3953                          LXI     H,WARN_MESB             ;PRINT WARNING MESSAGE
          21    165E                    .BYTE       <H*8> ! 1
      05'C8'    165F                    .BYTE       <WARN_MESB-HEAD>&255 , <<WARN_MESB-HEAD>&^XFF00>/256
                1661  3954                          CALL    PRINT_STRING_R
          CD    1661                    .BYTE       ^O315
       100E'    1662                    .WORD       <PRINT_STRING_R-HEAD>
                1664  3955                          LXI     H,WARN_MESA             ;PRINT WARNING MESSAGE
          21    1664                    .BYTE       <H*8> ! 1
      05'9A'    1665                    .BYTE       <WARN_MESA-HEAD>&255 , <<WARN_MESA-HEAD>&^XFF00>/256
                1667  3956                          CALL    PRINT_STRING_R
          CD    1667                    .BYTE       ^O315
       100E'    1668                    .WORD       <PRINT_STRING_R-HEAD>
                166A  3957
                166A  3958                          CALL    INPUT_LINE              ;WAIT FOR RESPONSE
          CD    166A                    .BYTE       ^O315
       102E'    166B                    .WORD       <INPUT_LINE-HEAD>
                166D  3959
                166D  3960                          MVI     C,1
       01 0E    166D                    .BYTE       <C*8> ! 6 , 1&255
                166F  3961                          LXI     H,TTBUF
          21    166F                    .BYTE       <H*8> ! 1
      08'D1'    1670                    .BYTE       <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
                1672  3962                          XCHG
```

```
         EB  1672                   .BYTE   ^0353
             1673  3963
             1673  3964                     LXI     H,ASCII_1
         21  1673                   .BYTE   <H*8> ! 1
     01'7B'  1674                   .BYTE   <ASCII_1-HEAD>&255 , <<ASCII_1-HEAD>&^XFF00>/256
             1676  3965                     CALL    COMPARE_R
         CD  1676                   .BYTE   ^0315
      0F55'  1677                   .WORD   <COMPARE_R-HEAD>
             1679  3966
             1679  3967                     IFZ
         C2  1679                   .BYTE   ^0302
      16A7'  167A                   .WORD   <2101$-HEAD>
             167C  3968                     CALL    CRLF_R
         CD  167C                   .BYTE   ^0315
      101A'  167D                   .WORD   <CRLF_R-HEAD>
             167F  3969                     LXI     H,WARN_MESS                     ;PRINT WARNING MESSAGE
         21  167F                   .BYTE   <H*8> ! 1
     04'B4'  1680                   .BYTE   <WARN_MESS-HEAD>&255 , <<WARN_MESS-HEAD>&^XFF00>/256
             1682  3970                     CALL    PRINT_STRING_R
         CD  1682                   .BYTE   ^0315
      100E'  1683                   .WORD   <PRINT_STRING_R-HEAD>
             1685  3971
             1685  3972                     CALL    INPUT_LINE
         CD  1685                   .BYTE   ^0315
      102E'  1686                   .WORD   <INPUT_LINE-HEAD>
             1688  3973
             1688  3974                     CLEAR   PRINT_START                     ;DON'T PRINT START OR PASSED
         AF  1688                   .BYTE   ^0250 ! A                   ;with A
         32  1689                   .BYTE   ^062
      03F0'  168A                   .WORD   <PRINT_START-HEAD>
             168C  3975                     CLEAR   PRINT_PASS                      ; MESSAGES
         AF  168C                   .BYTE   ^0250 ! A                   ;with A
         32  168D                   .BYTE   ^062
      03ED'  168E                   .WORD   <PRINT_PASS-HEAD>
             1690  3976
             1690  3977                     DO      60                              ;SET UP CURSER TO PRINT
         21  1690                   .BYTE   <H*8> ! 1
     00'55'  1691                   .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
         46  1693                   .BYTE   ^0100 ! <B*8> ! M
         C5  1694                   .BYTE   ^0305 ! <8*B>
      3C 3E  1695                   .BYTE   <A*8> ! 6 , 60&255
         77  1697                   .BYTE   ^0100 ! <M*8> ! A
             1698       2102$:
             1698  3978                     CALL    SPACE_R                         ; PASSED OR FAILED MESSAGE
         CD  1698                   .BYTE   ^0315
      1021'  1699                   .WORD   <SPACE_R-HEAD>
             169B  3979                     ENDDO
         21  169B                   .BYTE   <H*8> ! 1
     00'55'  169C                   .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
         35  169E                   .BYTE   ^05 ! <8*M>
         C2  169F                   .BYTE   ^0302
      1698'  16A0                   .WORD   <2102$-HEAD>
         C1  16A2                   .BYTE   ^0301 ! <8*B>
         70  16A3                   .BYTE   ^0100 ! <M*8> ! B
             16A4  3980
             16A4  3981                     JMP     PARSER                          ;TRY TEST AGAIN
         C3  16A4                   .BYTE   ^0303
```

```
  1DAE' 16A5             .WORD   <PARSER-HEAD>
        16A7  3982               ENDIF
        16A7       2101$:                                        ;GENERATE LCL 2101 NAME
        16A7  3983
        16A7  3984               LXI     H,ASCII_2
     21 16A7             .BYTE   <H*8> ! 1
 01'7C' 16A8             .BYTE   <ASCII_2-HEAD>&255 , <<ASCII_2-HEAD>&^XFF00>/256
        16AA  3985               CALL    COMPARE_R
     CD 16AA             .BYTE   ^0315
  0F55' 16AB             .WORD   <COMPARE_R-HEAD>
        16AD  3986
        16AD  3987               IFZ
     C2 16AD             .BYTE   ^0302
  16C6' 16AE             .WORD   <2103$-HEAD>
        16B0  3988               CLEAR   PRINT_PASS                      ; MESSAGES
     AF 16B0             .BYTE   ^0250 ! A               ;with A
     32 16B1             .BYTE   ^062
  03ED' 16B2             .WORD   <PRINT_PASS-HEAD>
        16B4  3989               CLEAR   PACK_ERROR
     AF 16B4             .BYTE   ^0250 ! A               ;with A
     32 16B5             .BYTE   ^062
  03D5' 16B6             .WORD   <PACK_ERROR-HEAD>
        16B8  3990               LXI     H,TEST_NUM
     21 16B8             .BYTE   <H*8> ! 1
 04'26' 16B9             .BYTE   <TEST_NUM-HEAD>&255 , <<TEST_NUM-HEAD>&^XFF00>/256
        16BB  3991               INR     M                               ;INCREMENT TEST NUM
     34 16BB             .BYTE   ^04 ! <8*M>
        16BC  3992               SET     EOS_FLG
     AF 16BC             .BYTE   ^0250 ! A               ;with A
     3C 16BD             .BYTE   ^04 ! <8*A>
     32 16BE             .BYTE   ^062
  0056' 16BF             .WORD   <EOS_FLG-HEAD>
        16C1  3993               CLEAR   PRINT_PASS                      ; MESSAGES
     AF 16C1             .BYTE   ^0250 ! A               ;with A
     32 16C2             .BYTE   ^062
  03ED' 16C3             .WORD   <PRINT_PASS-HEAD>
        16C5  3994               RET
     C9 16C5             .BYTE   ^0311
        16C6  3995               ENDIF
        16C6       2103$:                                        ;GENERATE LCL 2103 NAME
        16C6  3996
        16C6  3997               RET
     C9 16C6             .BYTE   ^0311
        16C7  3998
        16C7  3999 ;*************************************************************************
        16C7  4000 ;
        16C7  4001 ;  SET_PAR_INT
        16C7  4002 ;  THIS ROUTINE SETS A PARITY ERROR IN WCS ON REQUEST FROM THE CPU DIAG.
        16C7  4003 ;  THE ADDRESS TO SET THE PARITY ERROR ON IS IN LS 7
        16C7  4004 ;
        16C7  4005 ;*************************************************************************
        16C7  4006
        16C7  4007 SET_PAR_INT:     CALL    READ_LS_7                ;READ ADDRESS TO SET BAD PARITY
     CD 16C7             .BYTE   ^0315
  1165' 16C8             .WORD   <READ_LS_7-HEAD>
        16CA  4008
        16CA  4009               LXI     D,INPUT_NUM                     ;DESTINATION
```

```
         11  16CA               .BYTE   <D*8> ! 1
     06'76'  16CB               .BYTE   <INPUT_NUM-HEAD>&255 , <<INPUT_NUM-HEAD>&^XFF00>/256
             16CD  4010                 CALL    MOV_FROM_DATA0          ;MOVE 4 BYTES OF DATA FROM
         CD  16CD               .BYTE   ^0315
      0F70'  16CE               .WORD   <MOV_FROM_DATA0-HEAD>
             16D0  4011                                                 ; DATA0
             16D0  4012
             16D0  4013                 SET     WCS_BAD_PARITY          ;CHANGE PARITY TO BAD
         AF  16D0               .BYTE   ^0250 ! A               ;with A
         3C  16D1               .BYTE   ^04 ! <8*A>
         32  16D2               .BYTE   ^062
      006E'  16D3               .WORD   <WCS_BAD_PARITY-HEAD>
             16D5  4014                 CALL    CHANGE_WCS              ;WRITE WCS WITH BAD PARITY
         CD  16D5               .BYTE   ^0315
      0C1D'  16D6               .WORD   <CHANGE_WCS-HEAD>
             16D8  4015
             16D8  4016                 RET
         C9  16D8               .BYTE   ^0311
             16D9  4017
             16D9  4018
             16D9  4019 ;*************************************************************************************
             16D9  4020 ;
             16D9  4021 ;   CLEAR_PAR_INT
             16D9  4022 ;   THIS ROUTINE CLEARS A PARITY ERROR IN WCS ON REQUEST FROM THE CPU DIAG.
             16D9  4023 ;   THIS ALSO ENABLES HALT ON PARITY ERROR
             16D9  4024 ;   THE ADDRESS TO CLEAR THE PARITY ERROR ON IS IN LS 7
             16D9  4025 ;
             16D9  4026 ;*************************************************************************************
             16D9  4027
             16D9  4028 CLEAR_PAR_INT:
             16D9  4029                 CALL    READ_LS_7               ;READ ADDRESS TO SET GOOD PARITY
         CD  16D9               .BYTE   ^0315
      1165'  16DA               .WORD   <READ_LS_7-HEAD>
             16DC  4030
             16DC  4031                 LXI     D,INPUT_NUM             ;DESTINATION
         11  16DC               .BYTE   <D*8> ! 1
     06'76'  16DD               .BYTE   <INPUT_NUM-HEAD>&255 , <<INPUT_NUM-HEAD>&^XFF00>/256
             16DF  4032                 CALL    MOV_FROM_DATA0          ;MOVE 4 BYTES OF DATA FROM
         CD  16DF               .BYTE   ^0315
      0F70'  16E0               .WORD   <MOV_FROM_DATA0-HEAD>
             16E2  4033                                                 ; DATA0
             16E2  4034
             16E2  4035                 CLEAR   ERROR
         AF  16E2               .BYTE   ^0250 ! A               ;with A
         32  16E3               .BYTE   ^062
      02E2'  16E4               .WORD   <ERROR-HEAD>
             16E6  4036                 CALL    INT_CLEAR_PAR           ;SET THE PARITY GOOD
         CD  16E6               .BYTE   ^0315
      0BBB'  16E7               .WORD   <INT_CLEAR_PAR-HEAD>
             16E9  4037
             16E9  4038                 RET
         C9  16E9               .BYTE   ^0311
             16EA  4039
             16EA  4040
             16EA  4041 ;*************************************************************************************
             16EA  4042 ;
             16EA  4043 ;   PRINT_SINGLE
             16EA  4044 ;  THIS ROUTINES COMPARES THE NUMBER OF SINGLE BIT ERRORS IN A 256 K BLOCK
             16EA  4045 ;  OF MEMORY WITH THE PREDETERMINED MAXIMUM.  IT WILL REPORT A BAD MEMORY
             16EA  4046 ;  IF THE MAXIMUM IS MET OR EXCEEDED
             16EA  4047 ;
             16EA  4048 ;****************************************************************************
             16EA  4049
             16EA  4050 PRINT_SINGLE:   CALL    READ_LS_7                  ;READ DATA
         CD  16EA             .BYTE     ^O315
      1165'  16EB             .WORD     <READ_LS_7-HEAD>
             16ED  4051
             16ED  4052                 IFGT    DATA1,MAX_SBE,3            ;IF SINGLE BIT ERRORS FOUND ARE
         21  16ED             .BYTE     <H*8> ! 1
    00'AA'   16EE             .BYTE     <DATA1-HEAD>&255 , <<DATA1-HEAD>&^XFF00>/256
         11  16F0             .BYTE     <D*8> ! 1
    03'4A'   16F1             .BYTE     <MAX_SBE-HEAD>&255 , <<MAX_SBE-HEAD>&^XFF00>/256
      03 0E  16F3             .BYTE     <C*8> ! 6 , 3&255
         CD  16F5             .BYTE     ^O315
      00CF'  16F6             .WORD     <COMPARE-HEAD>
         F2  16F8             .BYTE     ^O362
      1722'  16F9             .WORD     <2104$-HEAD>
             16FB  4053                 LXI     H,FAIL_A                   ; GREATER THAN TOLERATED
         21  16FB             .BYTE     <H*8> ! 1
    02'EF'   16FC             .BYTE     <FAIL_A-HEAD>&255 , <<FAIL_A-HEAD>&^XFF00>/256
             16FE  4054                 CALL    PRINT_STRING_R             ;PRINT FAILURE
         CD  16FE             .BYTE     ^O315
      100E'  16FF             .WORD     <PRINT_STRING_R-HEAD>
             1701  4055                 CALL    CRLF_R
         CD  1701             .BYTE     ^O315
      101A'  1702             .WORD     <CRLF_R-HEAD>
             1704  4056                 LXI     H,ABORT_A                  ;PRINT ABORT MESSAGE
         21  1704             .BYTE     <H*8> ! 1
    01'64'   1705             .BYTE     <ABORT_A-HEAD>&255 , <<ABORT_A-HEAD>&^XFF00>/256
             1707  4057                 CALL    PRINT_STRING_R
         CD  1707             .BYTE     ^O315
      100E'  1708             .WORD     <PRINT_STRING_R-HEAD>
             170A  4058                 LXI     H,MEMORY_A                 ;PRINT MEMORY BAD
         21  170A             .BYTE     <H*8> ! 1
    03'4D'   170B             .BYTE     <MEMORY_A-HEAD>&255 , <<MEMORY_A-HEAD>&^XFF00>/256
             170D  4059                 CALL    PRINT_STRING_R
         CD  170D             .BYTE     ^O315
      100E'  170E             .WORD     <PRINT_STRING_R-HEAD>
             1710  4060                 LXI     H,BAD_A
         21  1710             .BYTE     <H*8> ! 1
    01'7E'   1711             .BYTE     <BAD_A-HEAD>&255 , <<BAD_A-HEAD>&^XFF00>/256
             1713  4061                 CALL    PRINT_STRING_R
         CD  1713             .BYTE     ^O315
      100E'  1714             .WORD     <PRINT_STRING_R-HEAD>
             1716  4062                 LXI     H,END_A                    ;PRINT END MESSAGE
         21  1716             .BYTE     <H*8> ! 1
    02'62'   1717             .BYTE     <END_A-HEAD>&255 , <<END_A-HEAD>&^XFF00>/256
             1719  4063                 CALL    PRINT_STRING_R
         CD  1719             .BYTE     ^O315
      100E'  171A             .WORD     <PRINT_STRING_R-HEAD>
             171C  4064                 CALL    CRLF_R
         CD  171C             .BYTE     ^O315
      101A'  171D             .WORD     <CRLF_R-HEAD>
             171F  4065                 JMP     STNDRD_CON_COM
```

```
     C3  171F               .BYTE    ^0303
  098A'  1720               .WORD    <STNDRD_CON_COM-HEAD>
         1722  4066                  ENDIF
         1722       2104$:                                      ;GENERATE LCL 2104 NAME
         1722  4067
         1722  4068                  RET
     C9  1722               .BYTE    ^0311
         1723  4069
         1723  4070 ;*******************************************************************************
         1723  4071 ;
         1723  4072 ;    PRINT_MOD_PRES
         1723  4073 ;    THIS ROUTINE PRINTS WHETHER THE MICRO DIAGNOSITIC FINDS THE FPA, UBE, IDC
         1723  4074 ;    OR R80
         1723  4075 ;
         1723  4076 ;*******************************************************************************
         1723  4077
         1723  4078 PRINT_MOD_PRES: CALL    READ_LS_7                ;LS 7 CONTAINS 1 FOR MOD PRES
     CD  1723               .BYTE    ^0315
  1165'  1724               .WORD    <READ_LS_7-HEAD>
         1726  4079                                                ; AND 0 FOR NOT PRESENT
         1726  4080                  IF      DATA3                  ;IF MODULE IS PRESENT
     3A  1726               .BYTE    ^072
  00AC'  1727               .WORD    <DATA3-HEAD>
     0F  1729               .BYTE    ^017
     D2  172A               .BYTE    ^0322
  172E'  172B               .WORD    <2105$-HEAD>
         172D  4081                  RET
     C9  172D               .BYTE    ^0311
         172E  4082                  ENDIF
         172E       2105$:                                      ;GENERATE LCL 2105 NAME
         172E  4083
         172E  4084                  CALL    CRLF_R
     CD  172E               .BYTE    ^0315
  101A'  172F               .WORD    <CRLF_R-HEAD>
         1731  4085                  LXI     H,FPA_A                ;PRINT FPA NOT PRESENT
     21  1731               .BYTE    <H*8> ! 1
 02'FE'  1732               .BYTE    <FPA_A-HEAD>&255 , <<FPA_A-HEAD>&^XFF00>/256
         1734  4086                  CALL    PRINT_STRING_R
     CD  1734               .BYTE    ^0315
  100E'  1735               .WORD    <PRINT_STRING_R-HEAD>
         1737  4087                  LXI     H,MOD_NOT_PRES_A       ;POINT TO MODULE NOT PRESENT
     21  1737               .BYTE    <H*8> ! 1
 03'96'  1738               .BYTE    <MOD_NOT_PRES_A-HEAD>&255 , <<MOD_NOT_PRES_A-HEAD>&^XFF00>/256
         173A  4088                  CALL    PRINT_STRING_R
     CD  173A               .BYTE    ^0315
  100E'  173B               .WORD    <PRINT_STRING_R-HEAD>
         173D  4089
         173D  4090                  CLEAR   PRINT_PASS             ;DO NOT PRINT 'PASS'
     AF  173D               .BYTE    ^0250 ! A            ;with A
     32  173E               .BYTE    ^062
  03ED'  173F               .WORD    <PRINT_PASS-HEAD>
         1741  4091
         1741  4092                  RET
     C9  1741               .BYTE    ^0311
         1742  4093
         1742  4094 PRINT_MOD_PRES_IDC:
         1742  4095                  CALL    READ_LS_7              ;LS 7 CONTAINS 1 FOR MOD PRES
```

```
      CD  1742                    .BYTE   ^0315
   1165'  1743                    .WORD   <READ_LS_7-HEAD>
          1745  4096                                                 ; AND 0 FOR NOT PRESENT
          1745  4097                      IF      DATA3              ;IF MODULE IS PRESENT
      3A  1745                    .BYTE   ^072
   00AC'  1746                    .WORD   <DATA3-HEAD>
      0F  1748                    .BYTE   ^017
      D2  1749                    .BYTE   ^0322
   174D'  174A                    .WORD   <2106$-HEAD>
          174C  4098                      RET
      C9  174C                    .BYTE   ^0311
          174D  4099                      ENDIF
          174D            2106$:                                     ;GENERATE LCL 2106 NAME
          174D  4100
          174D  4101                      LXI     H,RETURN_I         ;NO IDC RELOAD CONSOLE
      21  174D                    .BYTE   <H*8> ! 1
  07'66'  174E                    .BYTE   <RETURN_I-HEAD>&255 , <<RETURN_I-HEAD>&^XFF00>/256
          1750  4102                      SHLD    INSTR_PNT          ;
      22  1750                    .BYTE   ^042
   0345'  1751                    .WORD   <INSTR_PNT-HEAD>
          1753  4103
          1753  4104                      LXI     H,RETURN_N         ;THEN PRINT
      21  1753                    .BYTE   <H*8> ! 1
  07'ED'  1754                    .BYTE   <RETURN_N-HEAD>&255 , <<RETURN_N-HEAD>&^XFF00>/256
          1756  4105                      SHLD    NAME_PNT           ;CPU PART 3
      22  1756                    .BYTE   ^042
   03BA'  1757                    .WORD   <NAME_PNT-HEAD>
          1759  4106
          1759  4107                      LXI     H,RETURN_T         ;AND
      21  1759                    .BYTE   <H*8> ! 1
  08'20'  175A                    .BYTE   <RETURN_T-HEAD>&255 , <<RETURN_T-HEAD>&^XFF00>/256
          175C  4108                      SHLD    TIME_PNT           ;SET TIME
      22  175C                    .BYTE   ^042
   0448'  175D                    .WORD   <TIME_PNT-HEAD>
          175F  4109
          175F  4110                      RET
      C9  175F                    .BYTE   ^0311
          1760  4111
          1760  4112
          1760  4113  ;*******************************************************************************
          1760  4114  ;
          1760  4115  ;  SET_SIGNALS
          1760  4116  ;  THIS ROUTINE SETS UP THE SIGNALS AS THEY ARE DESCRIBED IN THE LS
          1760  4117  ;  COMMAND AND STATUS WORD BITS
          1760  4118  ;
          1760  4119  ;*******************************************************************************
          1760  4120
          1760  4121  SET_SIGNALS:       OUT     CLRHLT             ;CLEAR CONSOLE HALT
   AF D3  1760                    .BYTE   ^0323 , CLRHLT&255      ;register A
          1762  4122
          1762  4123                      IFMBI   COMMAND1,CONHLT    ;BIT 17
      3A  1762                    .BYTE   ^072
   00B0'  1763                    .WORD   <COMMAND1-HEAD>
      E6  1765                    .BYTE   ^0346
      02  1766                    .BYTE   CONHLT
      CA  1767                    .BYTE   ^0312
   176C'  1768                    .WORD   <2107$-HEAD>
```

```
         176A               OUT     SETHLT                  ;SET CONSOLE HALT
   AE D3 176A        .BYTE  ^0323 , SETHLT&255      ;register A
         176C               ENDIF
         176C  2107$:                                       ;GENERATE LCL 2107 NAME
         176C
         176C               OUT     CLRPFI                  ;CLEAR POWER FAIL INIT
   AD D3 176C        .BYTE  ^0323 , CLRPFI&255      ;register A
         176E
         176E               IFMBI   COMMAND1,PWRFAIL        ;BIT 18
      3A 176E        .BYTE  ^072
   00B0' 176F        .WORD  <COMMAND1-HEAD>
      E6 1771        .BYTE  ^0346
      04 1772        .BYTE  PWRFAIL
      CA 1773        .BYTE  ^0312
   1778' 1774        .WORD  <2108$-HEAD>
         1776               OUT     SETPFI                  ;SET POWER FAIL INIT
   AC D3 1776        .BYTE  ^0323 , SETPFI&255      ;register A
         1778               ENDIF
         1778  2108$:                                       ;GENERATE LCL 2108 NAME
         1778
         1778               OUT     CLRTIM                  ;CLEAR INTERVAL TIMER INIT
   A5 D3 1778        .BYTE  ^0323 , CLRTIM&255      ;register A
         177A
         177A               IFMBI   COMMAND1,INVTIM         ;BIT 19
      3A 177A        .BYTE  ^072
   00B0' 177B        .WORD  <COMMAND1-HEAD>
      E6 177D        .BYTE  ^0346
      08 177E        .BYTE  INVTIM
      CA 177F        .BYTE  ^0312
   1784' 1780        .WORD  <2109$-HEAD>
         1782               OUT     SETTIM                  ;SET INTERVAL TIMER INIT
   A4 D3 1782        .BYTE  ^0323 , SETTIM&255      ;register A
         1784               ENDIF
         1784  2109$:                                       ;GENERATE LCL 2109 NAME
         1784
         1784               OUT     CLRATN                  ;CLEAR CONSOLE ATTENTION
   AB D3 1784        .BYTE  ^0323 , CLRATN&255      ;register A
         1786
         1786               IFMBI   COMMAND1,CONATT         ;BIT 20
      3A 1786        .BYTE  ^072
   00B0' 1787        .WORD  <COMMAND1-HEAD>
      E6 1789        .BYTE  ^0346
      10 178A        .BYTE  CONATT
      CA 178B        .BYTE  ^0312
   1790' 178C        .WORD  <2110$-HEAD>
         178E               OUT     SETATN                  ;SET CONSOLE ATTENTION
   AA D3 178E        .BYTE  ^0323 , SETATN&255      ;register A
         1790               ENDIF
         1790  2110$:                                       ;GENERATE LCL 2110 NAME
         1790
         1790               CLEAR   SETACK_FLG              ;CLEAR FLAG TO CLEAR CONSOLE
      AF 1790        .BYTE  ^0250 ! A               ;with A
      32 1791        .BYTE  ^062
   0405' 1792        .WORD  <SETACK_FLG-HEAD>
         1794                                               ; ACKNOWLEDGE BEFORE RETURNING
         1794                                               ; TO WCS
         1794
         1794  4149              IFMBI   COMMAND1,CONACK                 ;BIT 21
     3A  1794            .BYTE   ^072
  00B0'  1795            .WORD   <COMMAND1-HEAD>
     E6  1797            .BYTE   ^0346
     20  1798            .BYTE   CONACK
     CA  1799            .BYTE   ^0312
  17A1'  179A            .WORD   <2111$-HEAD>
         179C  4150              SET     SETACK_FLG                      ;SET FLAG TO SET CONSOLE
     AF  179C            .BYTE   ^0250 ! A                   ;with A
     3C  179D            .BYTE   ^04 ! <8*A>
     32  179E            .BYTE   ^062
  0405'  179F            .WORD   <SETACK_FLG-HEAD>
         17A1  4151                                                      ; ACKNOWLEDGE BEFORE RETURNING
         17A1  4152                                                      ; TO WCS
         17A1  4153              ENDIF
         17A1        2111$:                                              ;GENERATE LCL 2111 NAME
         17A1  4154
         17A1  4155              SET     MEM_REQ                         ;ALLOW MEMORY REQEST WHEN
     AF  17A1            .BYTE   ^0250 ! A                   ;with A
     3C  17A2            .BYTE   ^04 ! <8*A>
     32  17A3            .BYTE   ^062
  0354'  17A4            .WORD   <MEM_REQ-HEAD>
         17A6  4156
         17A6  4157              IFMBI   COMMAND1,EMEMREF                ;BIT 22
     3A  17A6            .BYTE   ^072
  00B0'  17A7            .WORD   <COMMAND1-HEAD>
     E6  17A9            .BYTE   ^0346
     40  17AA            .BYTE   EMEMREF
     CA  17AB            .BYTE   ^0312
  17B2'  17AC            .WORD   <2112$-HEAD>
         17AE  4158              CLEAR   MEM_REQ                         ;DONT ALLOW MEM REQ WHEN
     AF  17AE            .BYTE   ^0250 ! A                   ;with A
     32  17AF            .BYTE   ^062
  0354'  17B0            .WORD   <MEM_REQ-HEAD>
         17B2  4159              ENDIF
         17B2        2112$:                                              ;GENERATE LCL 2112 NAME
         17B2  4160
         17B2  4161              OUT     INITL                           ;CLEAR UNIBUS INIT
  34 D3  17B2            .BYTE   ^0323 , INITL&255           ;register A
         17B4  4162
         17B4  4163              IFMBI   COMMAND0,UBS_INIT               ;BIT 28
     3A  17B4            .BYTE   ^072
  00AF'  17B5            .WORD   <COMMAND0-HEAD>
     E6  17B7            .BYTE   ^0346
     10  17B8            .BYTE   UBS_INIT
     CA  17B9            .BYTE   ^0312
  17BE'  17BA            .WORD   <2113$-HEAD>
         17BC  4164              OUT     INITH                           ;SET UNIBUS INIT
  35 D3  17BC            .BYTE   ^0323 , INITH&255           ;register A
         17BE  4165              ENDIF
         17BE        2113$:                                              ;GENERATE LCL 2113 NAME
         17BE  4166
         17BE  4167              OUT     CLRDCL                          ;CLEAR UNIBUS DC LO
  31 D3  17BE            .BYTE   ^0323 , CLRDCL&255          ;register A
         17C0  4168
         17C0  4169              IFMBI   COMMAND0,UBS_DC_LO              ;BIT 29
     3A  17C0            .BYTE   ^072
  00AF'  17C1               .WORD   <COMMANDO-HEAD>
     E6  17C3               .BYTE   ^0346
     20  17C4               .BYTE   UBS_DC_LO
     CA  17C5               .BYTE   ^0312
  17D2'  17C6               .WORD   <2114$-HEAD>
         17C8  4170                 CALL    NOP_CSR_R               ;LOAD CSR WITH A NOP
     CD  17C8               .BYTE   ^0315
  0ECA'  17C9               .WORD   <NOP_CSR_R-HEAD>
         17CB  4171                 OUT     SETDCL                  ;SET UNIBUS DC LO
  30 D3  17CB               .BYTE   ^0323 , SETDCL&255      ;register A
         17CD  4172                 CALL    MICRO_STEP_CPU_R        ;CLOCK THE SIGNAL INTO MCT
     CD  17CD               .BYTE   ^0315
  12A0'  17CE               .WORD   <MICRO_STEP_CPU_R-HEAD>
         17D0  4173                 OUT     CLRDCL                  ;CLEAR SIGNAL
  31 D3  17D0               .BYTE   ^0323 , CLRDCL&255      ;register A
         17D2  4174                 ENDIF
         17D2         2114$:                                        ;GENERATE LCL 2114 NAME
         17D2  4175
         17D2  4176                 OUT     CLRBSY                  ;CLEAR UNIBUS BUSY
  2E D3  17D2               .BYTE   ^0323 , CLRBSY&255      ;register A
         17D4  4177
         17D4  4178                 IFMBI   COMMANDO,UBS_BUSY       ;BIT 30
     3A  17D4               .BYTE   ^072
  00AF'  17D5               .WORD   <COMMANDO-HEAD>
     E6  17D7               .BYTE   ^0346
     40  17D8               .BYTE   UBS_BUSY
     CA  17D9               .BYTE   ^0312
  17DE'  17DA               .WORD   <2115$-HEAD>
         17DC  4179                 OUT     SETBSY                  ;SET UNIBUS BUSY
  2F D3  17DC               .BYTE   ^0323 , SETBSY&255      ;register A
         17DE  4180                 ENDIF
         17DE         2115$:                                        ;GENERATE LCL 2115 NAME
         17DE  4181
         17DE  4182                 RET
     C9  17DE               .BYTE   ^0311
         17DF  4183
         17DF  4184
         17DF  4185 ;*******************************************************************************
         17DF  4186 ;
         17DF  4187 ;  LOOPER
         17DF  4188 ;  THIS ROUTINE READS A COUNT FROM THE CPU AND CAUSES THE CPU TO LOOP
         17DF  4189 ;  THAT NUMBER OF TIMES BY SETTING THE ADDRESS TO ITS LOOP INSTRUCTION
         17DF  4190 ;  WHEN CALLED THE FIRST TIME THIS ROUTINE READS THE COUNT. ON ALL OTHER
         17DF  4191 ;  CALLS UNTIL THE COUNT = 0 THE COUNT IS DECREMENTED.  WHEN THE COUNT = 0
         17DF  4192 ;  THE ADDRESS IS SET FOR NO LOOPING AND THE NEXT CALL IS SET TO READ A
         17DF  4193 ;  NEW COUNT
         17DF  4194 ;
         17DF  4195 ;*******************************************************************************
         17DF  4196
         17DF  4197 LOOPER:
         17DF  4198                 IFN     HAVE_CNT
     3A  17DF               .BYTE   ^072
  033D'  17E0               .WORD   <HAVE_CNT-HEAD>
     0F  17E2               .BYTE   ^017
     DA  17E3               .BYTE   ^0332
  17F6'  17E4               .WORD   <2116$-HEAD>
         17E6  4199
```

```
               17E6  4200                    MVI     A,LOOP_CNT_ADD              ;READ LOOP COUNT (ONCE ONLY)
        47 3E  17E6                .BYTE     <A*8> ! 6 , LOOP_CNT_ADD&255
               17E8  4201                    CALL    READ_LS_R
           CD  17E8                .BYTE     ^0315
        1167'  17E9                .WORD     <READ_LS_R-HEAD>
               17EB  4202                    LDA     DATA3                       ;GET COUNT FROM DATA WORD
           3A  17EB                .BYTE     ^072
        00AC'  17EC                .WORD     <DATA3-HEAD>
               17EE  4203                    STA     LOOP_COUNTER                ;SAVE IT
           32  17EE                .BYTE     ^062
        0347'  17EF                .WORD     <LOOP_COUNTER-HEAD>
               17F1  4204
               17F1  4205                    SET     HAVE_CNT
           AF  17F1                .BYTE     ^0250 ! A                 ;with A
           3C  17F2                .BYTE     ^04 ! <8*A>
           32  17F3                .BYTE     ^062
        033D'  17F4                .WORD     <HAVE_CNT-HEAD>
               17F6  4206
               17F6  4207                    ENDIF
               17F6        2116$:                                                ;GENERATE LCL 2116 NAME
               17F6  4208
               17F6  4209                    LXI     H,LOOP_COUNTER
           21  17F6                .BYTE     <H*8> ! 1
      03'47'   17F7                .BYTE     <LOOP_COUNTER-HEAD>&255 , <<LOOP_COUNTER-HEAD>&^XFF00>/256
               17F9  4210                    DCR     M                           ;DECREMENT LOOP COUNT
           35  17F9                .BYTE     ^05 ! <8*M>
               17FA  4211                    RNZ                                 ;EXIT IF COUNT NOT EXPIRED
           C0  17FA                .BYTE     ^0300
               17FB  4212
               17FB  4213                    LXI     H,UPC_SUB                   ;MOVE UPC ONE EXTRA WORD
           21  17FB                .BYTE     <H*8> ! 1
      00'C6'   17FC                .BYTE     <UPC_SUB-HEAD>&255 , <<UPC_SUB-HEAD>&^XFF00>/256
               17FE  4214                    CALL    INC_WORD_R                  ;AND CAUSE IT TO START THERE
           CD  17FE                .BYTE     ^0315
        12B1'  17FF                .WORD     <INC_WORD_R-HEAD>
               1801  4215
               1801  4216                    CLEAR   HAVE_CNT                    ;SET TO READ A NEW COUNT
           AF  1801                .BYTE     ^0250 ! A                 ;with A
           32  1802                .BYTE     ^062
        033D'  1803                .WORD     <HAVE_CNT-HEAD>
               1805  4217
               1805  4218                    RET
           C9  1805                .BYTE     ^0311
               1806  4219
               1806  4220
               1806  4221 ;************************************************************************
               1806  4222 ;
               1806  4223 ;  SUB_ATTENTION
               1806  4224 ;  THIS ROUTINE IS USED AS AN IDLE ROUTINE WHEN EXECUTING A SUBROUTINE IN
               1806  4225 ;  WCS.  THERE IS NO READ OF THE COMMAND AND STATUS WORD AFTER AN ATTENTION
               1806  4226 ;  SIGNAL IS FOUND BECAUSE IT IS KNOWN THAT THIS MEANS END OF SUBROUTINE.
               1806  4227 ;  SEE ATTENTION ROUTINE FOR MORE INFO
               1806  4228 ;
               1806  4229 ;************************************************************************
               1806  4230
               1806  4231 SUB_ATTENTION:
               1806  4232                    CALL    RESET_TIMOUT                ;RESET TIMOUT COUNTER
      CD  1806                  .BYTE   ^0315
   1932'  1807                  .WORD   <RESET_TIMOUT-HEAD>
          1809  4233
          1809  4234                    WHILE   RUNNING
          1809        4002$:    LDA     RUNNING
      3A  1809                  .BYTE   ^072
   0403'  180A                  .WORD   <RUNNING-HEAD>
      0F  180C                  .BYTE   ^017
      D2  180D                  .BYTE   ^0322
   183D'  180E                  .WORD   <2117$-HEAD>
          1810  4235
          1810  4236                    LDA     MICRO_STEP                      ;GET MICRO STEP FLAG
      3A  1810                  .BYTE   ^072
   038A'  1811                  .WORD   <MICRO_STEP-HEAD>
          1813  4237                    ORA     A                               ;SET CONDITION CODES
      B7  1813                  .BYTE   ^0260 ! A
          1814  4238                    CNZ     MICRO_STEPER                    ;MICRO STEP CPU IF SET
      C4  1814                  .BYTE   ^0304
   1257'  1815                  .WORD   <MICRO_STEPER-HEAD>
          1817  4239
          1817  4240                    IN      CPATTN
   83 DB  1817                  .BYTE   ^0333 , CPATTN&255      ;to register A
          1819  4241                    RAR
      1F  1819                  .BYTE   ^037
          181A  4242
          181A  4243                    IFC                                     ;IF CPU_ATTENTION
      D2  181A                  .BYTE   ^0322
   1834'  181B                  .WORD   <2118$-HEAD>
          181D  4244                    IN      CPUACK
   82 DB  181D                  .BYTE   ^0333 , CPUACK&255      ;to register A
          181F  4245                    STA     ACK_SAVE
      32  181F                  .BYTE   ^062
   017A'  1820                  .WORD   <ACK_SAVE-HEAD>
          1822  4246                    CALL    RESET_TIMOUT
      CD  1822                  .BYTE   ^0315
   1932'  1823                  .WORD   <RESET_TIMOUT-HEAD>
          1825  4247                    CALL    STOP_CPU                        ;STOP SUBROUTINE
      CD  1825                  .BYTE   ^0315
   10C9'  1826                  .WORD   <STOP_CPU-HEAD>
          1828  4248
          1828  4249                    MVI     B,<^X22>                        ;ERROR CODE IF CPU ACK SET
   22 06  1828                  .BYTE   <B*8> ! 6 , ^X22&255
          182A  4250                    LDA     ACK_SAVE
      3A  182A                  .BYTE   ^072
   017A'  182B                  .WORD   <ACK_SAVE-HEAD>
          182D  4251                    RAR
      1F  182D                  .BYTE   ^037
          182E  4252                    JC      ERROR_ROUTINE_NO_RET            ;GO TO ERROR ROUTINE IF CPU
      DA  182E                  .BYTE   ^0332
   0C45'  182F                  .WORD   <ERROR_ROUTINE_NO_RET-HEAD>
          1831  4253                                                            ; ACK (CARRY) IS SET. DON'T
          1831  4254                                                            ; RETURN
          1831  4255
          1831  4256                    CALL    CHECK_CNTLC                     ;ELSE IF ^C TYPED, GO TO PARSER
      CD  1831                  .BYTE   ^0315
   1073'  1832                  .WORD   <CHECK_CNTLC-HEAD>
          1834  4257
```

```
         1834                           ENDIF
         1834   2118$:                                                ;GENERATE LCL 2118 NAME
         1834
         1834                           CALL    GCVECT                ;CHECK FOR OPERATOR REQUEST
      CD 1834               .BYTE       ^0315
    4129 1835               .WORD       <GCVECT-HEAD>
         1837                           CALL    TIMOUT
      CD 1837               .BYTE       ^0315
   1907' 1838               .WORD       <TIMOUT-HEAD>
         183A
         183A                           ENDWHILE
      C3 183A               .BYTE       ^0303
   1809' 183B               .WORD       <4002$-HEAD>
         183D   2117$:                                                ;GENERATE LCL 2117 NAME
         183D
         183D                           RET
      C9 183D               .BYTE       ^0311
         183E
         183E
         183E   ;*****************************************************************************
         183E   ;
         183E   ;  EOP
         183E   ;  THIS ROUTINE IS EXECUTED AT END OF PASS
         183E   ;
         183E   ;*****************************************************************************
         183E
         183E EOP:
         183E                           IF      PRINT_PASS
      3A 183E               .BYTE       ^072
   03ED' 183F               .WORD       <PRINT_PASS-HEAD>
      0F 1841               .BYTE       ^017
      D2 1842               .BYTE       ^0322
   184B' 1843               .WORD       <2119$-HEAD>
         1845
         1845                           LXI     H,PASS_A
      21 1845               .BYTE       <H*8> ! 1
 03'DE'  1846               .BYTE       <PASS_A-HEAD>&255 , <<PASS_A-HEAD>&^XFF00>/256
         1848                           CALL    PRINT_STRING_R
      CD 1848               .BYTE       ^0315
   100E' 1849               .WORD       <PRINT_STRING_R-HEAD>
         184B
         184B                           ENDIF
         184B   2119$:                                                ;GENERATE LCL 2119 NAME
         184B
         184B                           LXI     H,SEC_TABLE
      21 184B               .BYTE       <H*8> ! 1
 08'5F'  184C               .BYTE       <SEC_TABLE-HEAD>&255 , <<SEC_TABLE-HEAD>&^XFF00>/256
         184E                           SHLD    TABLE_PNT             ;RESET TABLE POINTER
      22 184E               .BYTE       ^042
   040C' 184F               .WORD       <TABLE_PNT-HEAD>
         1851
         1851                           CLEAR   EOS_FLG               ;RESET END OF SECTION
      AF 1851               .BYTE       ^0250 ! A             ;with A
      32 1852               .BYTE       ^062
   0056' 1853               .WORD       <EOS_FLG-HEAD>
         1855
         1855                           IFNEQ   PASS_CNT,F_WORD,2     ;-1 PASS CNT =INFINITE,SKIP OUT
```

```
     21 1855               .BYTE   <H*8> ! 1
 03'EA' 1856               .BYTE   <PASS_CNT-HEAD>&255 , <<PASS_CNT-HEAD>&^XFF00>/256
     11 1858               .BYTE   <D*8> ! 1
 00'58' 1859               .BYTE   <F_WORD-HEAD>&255 , <<F_WORD-HEAD>&^XFF00>/256
  02 0E 185B               .BYTE   <C*8> ! 6 , 2&255
     CD 185D               .BYTE   ^0315
  00CF' 185E               .WORD   <COMPARE-HEAD>
     CA 1860               .BYTE   ^0312
  1880' 1861               .WORD   <2120$-HEAD>
        1863  4289
        1863  4290                 LXI     H,PASS_CNT
     21 1863               .BYTE   <H*8> ! 1
 03'EA' 1864               .BYTE   <PASS_CNT-HEAD>&255 , <<PASS_CNT-HEAD>&^XFF00>/256
        1866  4291                 CALL    DECR_WORD_R             ;DECREMENT PASS COUNT
     CD 1866               .BYTE   ^0315
  12BC' 1867               .WORD   <DECR_WORD_R-HEAD>
        1869  4292
        1869  4293                 IFEQ    PASS_CNT,ZERO_WORD,2    ;IF PASS CNT = 0 CAUSE
     21 1869               .BYTE   <H*8> ! 1
 03'EA' 186A               .BYTE   <PASS_CNT-HEAD>&255 , <<PASS_CNT-HEAD>&^XFF00>/256
     11 186C               .BYTE   <D*8> ! 1
 05'96' 186D               .BYTE   <ZERO_WORD-HEAD>&255 , <<ZERO_WORD-HEAD>&^XFF00>/256
  02 0E 186F               .BYTE   <C*8> ! 6 , 2&255
     CD 1871               .BYTE   ^0315
  00CF' 1872               .WORD   <COMPARE-HEAD>
     C2 1874               .BYTE   ^0302
  1880' 1875               .WORD   <2121$-HEAD>
        1877  4294                                                 ;RETURN TO PARSER
        1877  4295                 SET     FILE_LOADED             ;CAUSE EXIT OF MAIN LOAD LOOP
     AF 1877               .BYTE   ^0250 ! A               ;with A
     3C 1878               .BYTE   ^04 ! <8*A>
     32 1879               .BYTE   ^062
  02FD' 187A               .WORD   <FILE_LOADED-HEAD>
        187C  4296                 CLEAR   EXECUTE
     AF 187C               .BYTE   ^0250 ! A               ;with A
     32 187D               .BYTE   ^062
  02EA' 187E               .WORD   <EXECUTE-HEAD>
        1880  4297                 ENDIF
        1880       2121$:                                          ;GENERATE LCL 2121 NAME
        1880  4298
        1880  4299                 ENDIF
        1880       2120$:                                          ;GENERATE LCL 2120 NAME
        1880  4300
        1880  4301                 RET
     C9 1880               .BYTE   ^0311
        1881  4302
        1881  4303 ;*****************************************************************************
        1881  4304 ;
        1881  4305 ;  BEGIN_OF_TEST
        1881  4306 ;  THIS ROUTINE HANDLES BEGINING OF TEST SENT FROM THE CPU
        1881  4307 ;  IF ALSO VERIFIES THE TEST SEQUENCE OF WCS TESTING
        1881  4308 ;
        1881  4309 ;*****************************************************************************
        1881  4310
        1881  4311 BEGIN_OF_TEST:
        1881  4312                 LXI     H,TEST_NUM
     21 1881               .BYTE   <H*8> ! 1
 04'26'  1882                 .BYTE   <TEST_NUM-HEAD>&255 , <<TEST_NUM-HEAD>&^XFF00>/256
         1884  4313                   INR     M                                  ;INCREMENT TEST NUM
     34  1884                 .BYTE   ^04 ! <8*M>
         1885  4314
         1885  4315                   IFGT    TEST_NUM,TEST_NUM2,1
     21  1885                 .BYTE   <H*8> ! 1
 04'26'  1886                 .BYTE   <TEST_NUM-HEAD>&255 , <<TEST_NUM-HEAD>&^XFF00>/256
     11  1888                 .BYTE   <D*8> ! 1
 04'28'  1889                 .BYTE   <TEST_NUM2-HEAD>&255 , <<TEST_NUM2-HEAD>&^XFF00>/256
  01 0E  188B                 .BYTE   <C*8> ! 6 , 1&255
     CD  188D                 .BYTE   ^0315
  00CF'  188E                 .WORD   <COMPARE-HEAD>
     F2  1890                 .BYTE   ^0362
  1898'  1891                 .WORD   <2122$-HEAD>
         1893  4316                   SET     EOS_FLG                            ;FORCE END OF SECTION
     AF  1893                 .BYTE   ^0250 ! A                      ;with A
     3C  1894                 .BYTE   ^04 ! <8*A>
     32  1895                 .BYTE   ^062
  0056'  1896                 .WORD   <EOS_FLG-HEAD>
         1898  4317                   ENDIF
         1898          2122$:                                                    ;GENERATE LCL 2122 NAME
         1898  4318
         1898  4319                   CALL    VERIFY_SEQ
     CD  1898                 .BYTE   ^0315
  18A1'  1899                 .WORD   <VERIFY_SEQ-HEAD>
         189B  4320                   SET     MEM_REQ
     AF  189B                 .BYTE   ^0250 ! A                      ;with A
     3C  189C                 .BYTE   ^04 ! <8*A>
     32  189D                 .BYTE   ^062
  0354'  189E                 .WORD   <MEM_REQ-HEAD>
         18A0  4321                   RET
     C9  18A0                 .BYTE   ^0311
         18A1  4322
         18A1  4323 ;************************************************************************************
         18A1  4324 ;
         18A1  4325 ;  VERIFY_SEQ
         18A1  4326 ;  THIS ROUTINE VERIFIES THE TESTS RUN IN SEQUENCE BY READING THE UPC
         18A1  4327 ;  AND COMPARING IT TO A KNOW VALUE
         18A1  4328 ;
         18A1  4329 ;************************************************************************************
         18A1  4330
         18A1  4331 VERIFY_SEQ:       LHLD    UPC_SUB
     2A  18A1                 .BYTE   ^052
  00C6'  18A2                 .WORD   <UPC_SUB-HEAD>
         18A4  4332                   SHLD    TEMP_WORD2                         ;SAVE GET UPC VALUE
     22  18A4                 .BYTE   ^042
  041D'  18A5                 .WORD   <TEMP_WORD2-HEAD>
         18A7  4333
         18A7  4334                   DO      4
     21  18A7                 .BYTE   <H*8> ! 1
 00'55'  18A8                 .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46  18AA                 .BYTE   ^0100 ! <B*8> ! M
     C5  18AB                 .BYTE   ^0305 ! <8*B>
  04 3E  18AC                 .BYTE   <A*8> ! 6 , 4&255
     77  18AE                 .BYTE   ^0100 ! <M*8> ! A
         18AF          2123$:
         18AF  4335
```

```
          18AF  4336                LXI     H,TEMP_WORD2                    ;MASK OFF WCS HIGH PAGE
     21   18AF              .BYTE   <H*8> ! 1
 04'1D'   18B0              .BYTE   <TEMP_WORD2-HEAD>&255 , <<TEMP_WORD2-HEAD>&^XFF00>/256
          18B2  4337                MOV     A,M
     7E   18B2              .BYTE   ^0100 ! <A*8> ! M
          18B3  4338                ANI     HEX_3F
     E6   18B3              .BYTE   ^0346
     3F   18B4              .BYTE   HEX_3F
          18B5  4339                MOV     M,A
     77   18B5              .BYTE   ^0100 ! <M*8> ! A
          18B6  4340                CALL    DECR_WORD_R                     ;INC VALUE BY 4
     CD   18B6              .BYTE   ^0315
  12BC'   18B7              .WORD   <DECR_WORD_R-HEAD>
          18B9  4341
          18B9  4342                ENDDO
     21   18B9              .BYTE   <H*8> ! 1
 00'55'   18BA              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     35   18BC              .BYTE   ^05 ! <8*M>
     C2   18BD              .BYTE   ^0302
  18AF'   18BE              .WORD   <2123$-HEAD>
     C1   18C0              .BYTE   ^0301 ! <8*B>
     70   18C1              .BYTE   ^0100 ! <M*8> ! B
          18C2  4343
          18C2  4344                CLEAR   WCS_ADDRESS
     AF   18C2              .BYTE   ^0250 ! A                       ;with A
     32   18C3              .BYTE   ^062
  006C'   18C4              .WORD   <WCS_ADDRESS-HEAD>
          18C6  4345                LDA     TEST_NUM                        ;GET KNOW VALUE FOR THIS TEST
     3A   18C6              .BYTE   ^072
  0426'   18C7              .WORD   <TEST_NUM-HEAD>
          18C9  4346                STA     WCS_ADDRESS+1                   ;FROM WCS
     32   18C9              .BYTE   ^062
  006D'   18CA              .WORD   <WCS_ADDRESS+1-HEAD>
          18CC  4347                CALL    READ_WCS_R
     CD   18CC              .BYTE   ^0315
  0E6D'   18CD              .WORD   <READ_WCS_R-HEAD>
          18CF  4348
          18CF  4349                DO      4
     21   18CF              .BYTE   <H*8> ! 1
 00'55'   18D0              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46   18D2              .BYTE   ^0100 ! <B*8> ! M
     C5   18D3              .BYTE   ^0305 ! <8*B>
  04 3E   18D4              .BYTE   <A*8> ! 6 , 4&255
     77   18D6              .BYTE   ^0100 ! <M*8> ! A
          18D7        2124$:
          18D7  4350                LXI     H,WCS_VALUE+2                   ;POINT TO WCS DATA
     21   18D7              .BYTE   <H*8> ! 1
 00'B6'   18D8              .BYTE   <WCS_VALUE+2-HEAD>&255 , <<WCS_VALUE+2-HEAD>&^XFF00>/256
          18DA  4351                MVI     C,3
  03 0E   18DA              .BYTE   <C*8> ! 6 , 3&255
          18DC  4352                CALL    SHIFTER1_R                      ;SHIFT 17-4(OF JUMP) TO 21-8
     CD   18DC              .BYTE   ^0315
  0EC1'   18DD              .WORD   <SHIFTER1_R-HEAD>
          18DF  4353                ENDDO
     21   18DF              .BYTE   <H*8> ! 1
 00'55'   18E0              .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     35   18E2              .BYTE   ^05 ! <8*M>
     C2  18E3             .BYTE   ^0302
  18D7'  18E4             .WORD   <2124$-HEAD>
     C1  18E6             .BYTE   ^0301 ! <8*B>
     70  18E7             .BYTE   ^0100 ! <M*8> ! B
         18E8
         18E8                     LDA     WCS_VALUE
     3A  18E8             .BYTE   ^072
  00B4'  18E9             .WORD   <WCS_VALUE-HEAD>
         18EB                     ANI     HEX_3F                    ;AND OUT TO ONLY ADDRESS
     E6  18EB             .BYTE   ^0346
     3F  18EC             .BYTE   HEX_3F
         18ED                     STA     WCS_VALUE
     32  18ED             .BYTE   ^062
  00B4'  18EE             .WORD   <WCS_VALUE-HEAD>
         18F0
         18F0                     IFNEQ   TEMP_WORD2,WCS_VALUE,2
     21  18F0             .BYTE   <H*8> ! 1
 04'1D'  18F1             .BYTE   <TEMP_WORD2-HEAD>&255 , <<TEMP_WORD2-HEAD>&^XFF00>/256
     11  18F3             .BYTE   <D*8> ! 1
 00'B4'  18F4             .BYTE   <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
  02 0E  18F6             .BYTE   <C*8> ! 6 , 2&255
     CD  18F8             .BYTE   ^0315
  00CF'  18F9             .WORD   <COMPARE-HEAD>
     CA  18FB             .BYTE   ^0312
  1906'  18FC             .WORD   <2125$-HEAD>
         18FE                     MVI     B,<^X23>                  ;SEQUENCE ERROR IN WCS TEST
  23 06  18FE             .BYTE   <B*8> ! 6 , ^X23&255
         1900                     CALL    ERROR_ROUTINE
     CD  1900             .BYTE   ^0315
  0C4A'  1901             .WORD   <ERROR_ROUTINE-HEAD>
         1903                     CALL    SET_FOR_CONT_R            ;ALLOW CONTINUE
     CD  1903             .BYTE   ^0315
  107B'  1904             .WORD   <SET_FOR_CONT_R-HEAD>
         1906                     ENDIF
         1906   2125$:                                              ;GENERATE LCL 2125 NAME
         1906
         1906                     RET
     C9  1906             .BYTE   ^0311
         1907
         1907   ;**************************************************************************
         1907   ;
         1907   ;  TIMOUT
         1907   ;  THIS ROUTINE IS USED TO TELL IF THE CPU IS NOT RESPONDING
         1907   ;  IN A REASONABLE TIME PERIOD.  IF THE COUNTER OVERFLOWS A TIMOUT
         1907   ;  HAS OCCURED.
         1907   ;
         1907   ;**************************************************************************
         1907
         1907   TIMOUT:           IFNMBI  FLAGS,LOOP_S_DEF
     3A  1907             .BYTE   ^072
  005A'  1908             .WORD   <FLAGS-HEAD>
     E6  190A             .BYTE   ^0346
     01  190B             .BYTE   LOOP_S_DEF
     C2  190C             .BYTE   ^0302
  192E'  190D             .WORD   <2126$-HEAD>
         190F
         190F                     LXI     H,TIMOUT_CNT              ;COUNTER FOR TIMING
```

```
      21  190F                 .BYTE   <H*8> ! 1
 04'4A'  1910                 .BYTE   <TIMOUT_CNT-HEAD>&255 , <<TIMOUT_CNT-HEAD>&^XFF00>/256
         1912  4379                    CALL    INC_WORD_R                  ;INCREMENT COUNTER
      CD  1912                 .BYTE   ^0315
  12B1'  1913                 .WORD   <INC_WORD_R-HEAD>
         1915  4380
         1915  4381                    IFEQ    TIMOUT_CNT,ZERO_WORD,2
      21  1915                 .BYTE   <H*8> ! 1
 04'4A'  1916                 .BYTE   <TIMOUT_CNT-HEAD>&255 , <<TIMOUT_CNT-HEAD>&^XFF00>/256
      11  1918                 .BYTE   <D*8> ! 1
 05'96'  1919                 .BYTE   <ZERO_WORD-HEAD>&255 , <<ZERO_WORD-HEAD>&^XFF00>/256
   02 0E  191B                 .BYTE   <C*8> ! 6 , 2&255
      CD  191D                 .BYTE   ^0315
  00CF'  191E                 .WORD   <COMPARE-HEAD>
      C2  1920                 .BYTE   ^0302
  192B'  1921                 .WORD   <2127$-HEAD>
         1923  4382                    MVI     B,<^X24>                    ;OVERFLOW, PRINT ERROR
   24 06  1923                 .BYTE   <B*8> ! 6 , ^X24&255
         1925  4383                    CALL    ERROR_ROUTINE
      CD  1925                 .BYTE   ^0315
  0C4A'  1926                 .WORD   <ERROR_ROUTINE-HEAD>
         1928  4384                    CALL    SET_FOR_CONT_R              ;GO TO COMMAND LEVEL
      CD  1928                 .BYTE   ^0315
  107B'  1929                 .WORD   <SET_FOR_CONT_R-HEAD>
         192B  4385                    ENDIF
         192B          2127$:                                              ;GENERATE LCL 2127 NAME
         192B  4386
         192B  4387                    ELSE
      C3  192B                 .BYTE   ^0303
  1931'  192C                 .WORD   <2128$-HEAD>
         192E          2126$:                                              ;GENERATE LOCAL SYMBOL NAME
         192E  4388                    CALL    CHECK_CNTLC                 ;IF ERROR LOOPING, CHECK
      CD  192E                 .BYTE   ^0315
  1073'  192F                 .WORD   <CHECK_CNTLC-HEAD>
         1931  4389                                                        ; FOR ^C FROM OPERATOR
         1931  4390                    ENDIF
         1931          2128$:                                              ;GENERATE LCL 2128 NAME
         1931  4391
         1931  4392                    RET
      C9  1931                 .BYTE   ^0311
         1932  4393
         1932  4394  ;*************************************************************************
         1932  4395  ;
         1932  4396  ;  RESET_TIMOUT
         1932  4397  ;  THIS ROUTINE RESETS THE TIMEOUT COUNTERS TO ZERO FOR A FULL
         1932  4398  ;  TIMOUT PERIOD
         1932  4399  ;
         1932  4400  ;*************************************************************************
         1932  4401
         1932  4402  RESET_TIMOUT:   LXI     H,TIMOUT_CNT
      21  1932                 .BYTE   <H*8> ! 1
 04'4A'  1933                 .BYTE   <TIMOUT_CNT-HEAD>&255 , <<TIMOUT_CNT-HEAD>&^XFF00>/256
         1935  4403                    XRA     A
      AF  1935                 .BYTE   ^0250 ! A                   ;with A
         1936  4404                    MOV     M,A
      77  1936                 .BYTE   ^0100 ! <M*8> ! A
         1937  4405                    INX     H
      23  1937                    .BYTE   <H*8> ! 3
          1938   4406                     MOV     M,A
      77  1938                    .BYTE   ^0100 ! <M*8> ! A
          1939   4407                     RET
      C9  1939                    .BYTE   ^0311
          193A   4408
          193A   4409
          193A   4410 ;************************************************************************
          193A   4411 ;
          193A   4412 ;   PARITY_ERR
          193A   4413 ;   THIS ROUTINE GETS CONTROL ON A PARITY ERROR INTERRUPT
          193A   4414 ;   THE INTERRUPT COULD ALSO BE KNOWN PARITY ERRORS SUCH AS A SOMM
          193A   4415 ;
          193A   4416 ;************************************************************************
          193A   4417
          193A   4418 PARITY_ERR:        PUSH    $PSW                    ;SAVE FLAGS AND ACCUMULATOR
      F5  193A                    .BYTE   ^0305 ! <8*$PSW>
          193B   4419                     PUSH    B                       ;SAVE BC PAIR
      C5  193B                    .BYTE   ^0305 ! <8*B>
          193C   4420                     PUSH    D                       ;SAVE DE PAIR
      D5  193C                    .BYTE   ^0305 ! <8*D>
          193D   4421                     PUSH    H                       ;SAVE HL PAIR
      E5  193D                    .BYTE   ^0305 ! <8*H>
          193E   4422                     CALL    STOP_CPU                ;STOP THE CLOCK
      CD  193E                    .BYTE   ^0315
   10C9'  193F                    .WORD   <STOP_CPU-HEAD>
          1941   4423                     LDA     CNT_PAR                 ;GET COUNT OF PARITY ERRORS
      3A  1941                    .BYTE   ^072
   0254'  1942                    .WORD   <CNT_PAR-HEAD>
          1944   4424                     INR     A                       ;INC COUNT
      3C  1944                    .BYTE   ^04 ! <8*A>
          1945   4425                     STA     CNT_PAR                 ;UPDATE COUNT
      32  1945                    .BYTE   ^062
   0254'  1946                    .WORD   <CNT_PAR-HEAD>
          1948   4426
          1948   4427                     CPI     2                       ;SEE IF PARITY COUNT=2 (SECOND
      FE  1948                    .BYTE   ^0376
      02  1949                    .BYTE   2
          194A   4428                                                     ; PARITY ERROR OCCURED)
          194A   4429                     JZ      1$                      ;DON'T TRY SAVE_WR IF SO
      CA  194A                    .BYTE   ^0312
   1951'  194B                    .WORD   <1$-HEAD>
          194D   4430
          194D   4431                     EI                              ;REENABLE INTERRUPTS
      FB  194D                    .BYTE   ^0373
          194E   4432                     CALL    SAVE_WR
      CD  194E                    .BYTE   ^0315
   0C11'  194F                    .WORD   <SAVE_WR-HEAD>
          1951   4433 1$:                 LHLD    SAVED_UPC
      2A  1951                    .BYTE   ^052
   00C4'  1952                    .WORD   <SAVED_UPC-HEAD>
          1954   4434                     SHLD    HEX_BUF                 ;SAVE UPC
      22  1954                    .BYTE   ^042
   005B'  1955                    .WORD   <HEX_BUF-HEAD>
          1957   4435                     LXI     H,HEX_BUF               ;POINT TO STORED UPC
      21  1957                    .BYTE   <H*8> ! 1
 00'5B'   1958                    .BYTE   <HEX_BUF-HEAD>&255 , <<HEX_BUF-HEAD>&^XFF00>/256
```

```
          195A  4436                  CALL    DECR_WORD_R            ;BACK UP UPC..PARITY ERROR
      CD  195A              .BYTE     ^0315
   12BC'  195B              .WORD     <DECR_WORD_R-HEAD>
          195D  4437                                                 ; HAS ALREADY REACHED CSR
          195D  4438
          195D  4439                  CALL    CHECK_LS_SETPAR        ;CHECK TO SEE IF PARITY ERROR
      CD  195D              .BYTE     ^0315
   197D'  195E              .WORD     <CHECK_LS_SETPAR-HEAD>
          1960  4440                                                 ; WAS INTENTIONAL
          1960  4441
          1960  4442                  IF      LS_PARERR_ACT
      3A  1960              .BYTE     ^072
   0349'  1961              .WORD     <LS_PARERR_ACT-HEAD>
      0F  1963              .BYTE     ^017
      D2  1964              .BYTE     ^0322
   1970'  1965              .WORD     <2129$-HEAD>
          1967  4443                  LXI     H,NOP_INST             ;SET UP TO PUT NOP IN CSR
      21  1967              .BYTE     <H*8> ! 1
  00'72'  1968              .BYTE     <NOP_INST-HEAD>&255 , <<NOP_INST-HEAD>&^XFF00>/256
          196A  4444                  LXI     D,SAVED_CSR
      11  196A              .BYTE     <D*8> ! 1
  00'BB'  196B              .BYTE     <SAVED_CSR-HEAD>&255 , <<SAVED_CSR-HEAD>&^XFF00>/256
          196D  4445                  CALL    MOVER_3_R
      CD  196D              .BYTE     ^0315
   0F5F'  196E              .WORD     <MOVER_3_R-HEAD>
          1970  4446                  ENDIF
          1970        2129$:                                         ;GENERATE LCL 2129 NAME
          1970  4447
          1970  4448                  CLEAR   LS_PARERR_ACT          ;CLEAR FLG IN CASE IT IS SET
      AF  1970              .BYTE     ^0250 ! A             ;with A
      32  1971              .BYTE     ^062
   0349'  1972              .WORD     <LS_PARERR_ACT-HEAD>
          1974  4449                  CALL    RESTART_CPU
      CD  1974              .BYTE     ^0315
   110E'  1975              .WORD     <RESTART_CPU-HEAD>
          1977  4450
          1977  4451                  POP     H                      ;RESTORE HL PAIR
      E1  1977              .BYTE     ^0301 ! <8*H>
          1978  4452                  POP     D                      ;RESTORE DE PAIR
      D1  1978              .BYTE     ^0301 ! <8*D>
          1979  4453                  POP     B                      ;RESTORE BC PAIR
      C1  1979              .BYTE     ^0301 ! <8*B>
          197A  4454                  POP     $PSW                   ;RESTORE FLAGS AND ACCUMULATOR
      F1  197A              .BYTE     ^0301 ! <8*$PSW>
          197B  4455
          197B  4456                  EI                             ;REENABLE INTERRUPTS
      FB  197B              .BYTE     ^0373
          197C  4457                  RET
      C9  197C              .BYTE     ^0311
          197D  4458
          197D  4459  ;
          197D  4460  ; THIS ROUTINE CHECKS TO SEE IF PARITY ERROR WAS CAUSED BY INTENTIONALLY
          197D  4461  ; PUTTING A PARITY ERROR IN WCS VIA A COMMAND FROM THE CPU MICRO-CODE
          197D  4462  ;
          197D  4463
          197D  4464  CHECK_LS_SETPAR:
          197D  4465                  IF      LS_SETPARERR
```

```
       3A  197D              .BYTE    ^072
    0348'  197E              .WORD    <LS_SETPARERR-HEAD>
       0F  1980              .BYTE    ^017
       D2  1981              .BYTE    ^0322
    198C'  1982              .WORD    <2130$-HEAD>
           1984  4466                 SET     LS_PARERR_ACT              ;SET LS PARITY ERROR ACTIVE FLG
       AF  1984              .BYTE    ^0250 ! A                ;with A
       3C  1985              .BYTE    ^04 ! <8*A>
       32  1986              .BYTE    ^062
    0349'  1987              .WORD    <LS_PARERR_ACT-HEAD>
           1989  4467
           1989  4468                 ELSE
       C3  1989              .BYTE    ^0303
    1995'  198A              .WORD    <2131$-HEAD>
           198C        2130$:                                        ;GENERATE LOCAL SYMBOL NAME
           198C  4469
           198C  4470                 MVI     B,<^X26>                   ;ERROR - WCS PARITY ERROR
    26 06  198C              .BYTE    <B*8> ! 6 , ^X26&255
           198E  4471                 CALL    ERROR_ROUTINE
       CD  198E              .BYTE    ^0315
    0C4A'  198F              .WORD    <ERROR_ROUTINE-HEAD>
           1991  4472                 EI                                 ;REENABLE INTERRUPTS
       FB  1991              .BYTE    ^0373
           1992  4473                 CALL    SET_FOR_CONT_R             ;ALLOW CONTINUE FROM HERE
       CD  1992              .BYTE    ^0315
    107B'  1993              .WORD    <SET_FOR_CONT_R-HEAD>
           1995  4474
           1995  4475                 ENDIF
           1995        2131$:                                        ;GENERATE LCL 2131 NAME
           1995  4476                 RET                                ;BACK TO PAR ERR ROUTINE
       C9  1995              .BYTE    ^0311
           1996  4477
           1996  4478 ;*****************************************************************************
           1996  4479 ;
           1996  4480 ;  DATA_XFER
           1996  4481 ;  THIS ROUTINE TRANSFERS DATA FROM THE WCS MEMORY TO LS OR MAIN MEMORY
           1996  4482 ;  A POINTER IS USED AND INCREMENTED AFTER EACH XFER.  THIS POINTER POINTS
           1996  4483 ;  TO ANOTHER POINTER THAT POINTS TO A DATA CONTROL BLOCK.  THE DATA
           1996  4484 ;  CONTROL BLOCK CONTAINS THE BYTE COUNT AND  DESTINATION ADDRESS OF THE
           1996  4485 ;  DATA.  THE POINTER IN WCS ALSO CONTAINS ONE BIT THAT TELLS IF THE
           1996  4486 ;  TRANSFER IS FOR LS OR MAIN MEMORY.
           1996  4487 ;
           1996  4488 ;*****************************************************************************
           1996  4489
           1996  4490 DATA_XFER:     SET     DATA_XFER_FLG              ;SET XFER FLAG
       AF  1996              .BYTE    ^0250 ! A                ;with A
       3C  1997              .BYTE    ^04 ! <8*A>
       32  1998              .BYTE    ^062
    025E'  1999              .WORD    <DATA_XFER_FLG-HEAD>
           199B  4491
           199B  4492                 CALL    READ_LS_7                  ;READ THE POINTER
       CD  199B              .BYTE    ^0315
    1165'  199C              .WORD    <READ_LS_7-HEAD>
           199E  4493
           199E  4494                 LXI     H,DATA2
       21  199E              .BYTE    <H*8> ! 1
  00'AB'   199F              .BYTE    <DATA2-HEAD>&255 , <<DATA2-HEAD>&^XFF00>/256
```

```
         19A1  4495                       MOV     A,M
     7E  19A1                     .BYTE   ^0100 ! <A*8> ! M
         19A2  4496                       ANI     HEX_3F
     E6  19A2                     .BYTE   ^0346
     3F  19A3                     .BYTE   HEX_3F
         19A4  4497                       STA     WCS_ADDRESS
     32  19A4                     .BYTE   ^062
  006C'  19A5                     .WORD   <WCS_ADDRESS-HEAD>
         19A7  4498                       INX     H
     23  19A7                     .BYTE   <H*8> ! 3
         19A8  4499                       MOV     A,M
     7E  19A8                     .BYTE   ^0100 ! <A*8> ! M
         19A9  4500                       STA     WCS_ADDRESS+1               ;SAVE POINTER FOR READ
     32  19A9                     .BYTE   ^062
  006D'  19AA                     .WORD   <WCS_ADDRESS+1-HEAD>
         19AC  4501
         19AC  4502                       CALL    READ_WCS_R                  ;READ FIRST DATA WORD(COUNT)
     CD  19AC                     .BYTE   ^0315
  0E6D'  19AD                     .WORD   <READ_WCS_R-HEAD>
         19AF  4503
         19AF  4504                       LHLD    WCS_VALUE+1
     2A  19AF                     .BYTE   ^052
  00B5'  19B0                     .WORD   <WCS_VALUE+1-HEAD>
         19B2  4505                       SHLD    XFER_CNT                    ;NUMBER OF BYTES TO XFER
     22  19B2                     .BYTE   ^042
  058D'  19B3                     .WORD   <XFER_CNT-HEAD>
         19B5  4506
         19B5  4507                       CLEAR   XFER_MM                     ;SET TRANSFER TO LS TO START
     AF  19B5                     .BYTE   ^0250 ! A              ;with A
     32  19B6                     .BYTE   ^062
  0592'  19B7                     .WORD   <XFER_MM-HEAD>
         19B9  4508
         19B9  4509                       IFMBI   WCS_VALUE,MM_OR_LS
     3A  19B9                     .BYTE   ^072
  00B4'  19BA                     .WORD   <WCS_VALUE-HEAD>
     E6  19BC                     .BYTE   ^0346
     01  19BD                     .BYTE   MM_OR_LS
     CA  19BE                     .BYTE   ^0312
  19C6'  19BF                     .WORD   <2132$-HEAD>
         19C1  4510                       SET     XFER_MM                     ;TRANSFER IS TO MM, SET FLAG
     AF  19C1                     .BYTE   ^0250 ! A              ;with A
     3C  19C2                     .BYTE   ^04 ! <8*A>
     32  19C3                     .BYTE   ^062
  0592'  19C4                     .WORD   <XFER_MM-HEAD>
         19C6  4511                       ENDIF
         19C6         2132$:                                                  ;GENERATE LCL 2132 NAME
         19C6  4512
         19C6  4513                       LXI     H,WCS_ADDRESS
     21  19C6                     .BYTE   <H*8> ! 1
 00'6C'  19C7                     .BYTE   <WCS_ADDRESS-HEAD>&255 , <<WCS_ADDRESS-HEAD>&^XFF00>/256
         19C9  4514                       CALL    INC_WORD_R
     CD  19C9                     .BYTE   ^0315
  12B1'  19CA                     .WORD   <INC_WORD_R-HEAD>
         19CC  4515                       CALL    READ_WCS_R                  ;READ DEST ADDRESS
     CD  19CC                     .BYTE   ^0315
  0E6D'  19CD                     .WORD   <READ_WCS_R-HEAD>
         19CF  4516
         19CF  4517                      LXI     H,WCS_VALUE
     21  19CF                  .BYTE     <H*8> ! 1
 00'B4'  19D0                  .BYTE     <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
         19D2  4518                      LXI     D,XFER_DEST
     11  19D2                  .BYTE     <D*8> ! 1
 05'8F'  19D3                  .BYTE     <XFER_DEST-HEAD>&255 , <<XFER_DEST-HEAD>&^XFF00>/256
         19D5  4519                      CALL    MOVER_3_R                     ;SAVE DEST ADDRESS
     CD  19D5                  .BYTE     ^O315
  0F5F'  19D6                  .WORD     <MOVER_3_R-HEAD>
         19D8  4520
         19D8  4521                      LXI     H,WCS_VALUE                   ;SAVE DEST ADDRESS IN DATA
     21  19D8                  .BYTE     <H*8> ! 1
 00'B4'  19D9                  .BYTE     <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
         19DB  4522                      LXI     D,DATA1                       ;AREA FOR WRITE TO LS ON
     11  19DB                  .BYTE     <D*8> ! 1
 00'AA'  19DC                  .BYTE     <DATA1-HEAD>&255 , <<DATA1-HEAD>&^XFF00>/256
         19DE  4523                                                            ;MM XFER
         19DE  4524                      CALL    MOVER_3_R
     CD  19DE                  .BYTE     ^O315
  0F5F'  19DF                  .WORD     <MOVER_3_R-HEAD>
         19E1  4525                      XRA     A
     AF  19E1                  .BYTE     ^O250 ! A                ;with A
         19E2  4526                      STA     DATA0                         ;ZERO OUT TOP BYTE
     32  19E2                  .BYTE     ^O62
  00A9'  19E3                  .WORD     <DATA0-HEAD>
         19E5  4527
         19E5  4528                      IF      XFER_MM
     3A  19E5                  .BYTE     ^O72
  0592'  19E6                  .WORD     <XFER_MM-HEAD>
     0F  19E8                  .BYTE     ^O17
     D2  19E9                  .BYTE     ^O322
  19F1'  19EA                  .WORD     <2133$-HEAD>
         19EC  4529
         19EC  4530                      MVI     A,LS_5                        ;LS ADDRESS TO WRITE
  05 3E  19EC                  .BYTE     <A*8> ! 6 , LS_5&255
         19EE  4531                      CALL    WRITE_LS_R                    ;WITH MM ADDRESS
     CD  19EE                  .BYTE     ^O315
  1146'  19EF                  .WORD     <WRITE_LS_R-HEAD>
         19F1  4532
         19F1  4533                      ENDIF
         19F1            2133$:                                                ;GENERATE LCL 2133 NAME
         19F1  4534
         19F1  4535                      LHLD    WCS_ADDRESS
     2A  19F1                  .BYTE     ^O52
  006C'  19F2                  .WORD     <WCS_ADDRESS-HEAD>
         19F4  4536                      SHLD    XFER_PNT
     22  19F4                  .BYTE     ^O42
  0593'  19F5                  .WORD     <XFER_PNT-HEAD>
         19F7  4537
         19F7  4538                      WHILER  MORE_DATA                     ;LOOP CONTROL BYTE
     AF  19F7                  .BYTE     ^O250 ! A                ;with A
     3C  19F8                  .BYTE     ^O4 ! <8*A>
     32  19F9                  .BYTE     ^O62
  03AF'  19FA                  .WORD     <MORE_DATA-HEAD>
         19FC            4003$:  LDA     MORE_DATA
     3A  19FC                  .BYTE     ^O72
  03AF'  19FD                  .WORD     <MORE_DATA-HEAD>
```

```
     0F  19FF                      .BYTE   ^017
     D2  1A00                      .BYTE   ^0322
  1A28'  1A01                      .WORD   <2134$-HEAD>
         1A03  4539                        CALL     FOUR_BYTES               ;READ LONG WORD OF DATA (WCS)
     CD  1A03                      .BYTE   ^0315
  1A29'  1A04                      .WORD   <FOUR_BYTES-HEAD>
         1A06  4540
         1A06  4541                        IF       XFER_MM
     3A  1A06                      .BYTE   ^072
  0592'  1A07                      .WORD   <XFER_MM-HEAD>
     0F  1A09                      .BYTE   ^017
     D2  1A0A                      .BYTE   ^0322
  1A1B'  1A0B                      .WORD   <2135$-HEAD>
         1A0D  4542                        MVI      A,LS_6                   ;LS DATA TO WRITE
  06 3E  1A0D                      .BYTE   <A*8> ! 6 , [S_6&255
         1A0F  4543                        CALL     WRITE_[S_R               ;WITH DATA FOR MM
     CD  1A0F                      .BYTE   ^0315
  1146'  1A10                      .WORD   <WRITE_LS_R-HEAD>
         1A12  4544
         1A12  4545                        LXI      H,WCS_DE_MM
     21  1A12                      .BYTE   <H*8> ! 1
  00 54  1A13                      .BYTE   <WCS_DE_MM-HEAD>&255 , <<WCS_DE_MM-HEAD>&^XFF00>/256
         1A15  4546                        CALL     EXEC_SUB                 ;DO THE SUBROUTINE
     CD  1A15                      .BYTE   ^0315
  0B7D'  1A16                      .WORD   <EXEC_SUB-HEAD>
         1A18  4547
         1A18  4548                        ELSE
     C3  1A18                      .BYTE   ^0303
  1A25'  1A19                      .WORD   <2136$-HEAD>
         1A1B        2135$:                                              ;GENERATE LOCAL SYMBOL NAME
         1A1B  4549
         1A1B  4550                        LDA      XFER_DEST+2              ;ADDRESS TO WRITE IN LS
     3A  1A1B                      .BYTE   ^072
  0591'  1A1C                      .WORD   <XFER_DEST+2-HEAD>
         1A1E  4551                        CALL     WRITE_LS_R
     CD  1A1E                      .BYTE   ^0315
  1146'  1A1F                      .WORD   <WRITE_LS_R-HEAD>
         1A21  4552
         1A21  4553                        LXI      H,XFER_DEST+2            ;INC DEST POINTER FOR LS
     21  1A21                      .BYTE   <H*8> ! 1
05'91'   1A22                      .BYTE   <XFER_DEST+2-HEAD>&255 , <<XFER_DEST+2-HEAD>&^XFF00>/256
         1A24  4554                        INR      M                        ;WRITE(MM IS AUTOMATIC)
     34  1A24                      .BYTE   ^04 ! <8*M>
         1A25  4555
         1A25  4556                        ENDIF
         1A25        2136$:                                              ;GENERATE LCL 2136 NAME
         1A25  4557
         1A25  4558                        ENDWHILE
     C3  1A25                      .BYTE   ^0303
  19FC'  1A26                      .WORD   <4003$-HEAD>
         1A28        2134$:                                              ;GENERATE LCL 2134 NAME
         1A28  4559
         1A28  4560                        RET
     C9  1A28                      .BYTE   ^0311
         1A29  4561
         1A29  4562
         1A29  4563
```

```
                 1A29  4564
                 1A29  4565 ;************************************************************************
                 1A29  4566 ;
                 1A29  4567 ;  FOUR_BYTES
                 1A29  4568 ;  THIS ROUTINE READS FOUR BYTES OF DATA FROM WCS USING XFER_PNT
                 1A29  4569 ;  THE DATA IS MOVED TO THE DATA0,1,2,3 AREAS.  IF THE COUNT XFER_CNT
                 1A29  4570 ;  RUNS OUT THE LOOP CONTROL FLAG MORE_DATA IS CLEARED
                 1A29  4571 ;
                 1A29  4572 ;************************************************************************
                 1A29  4573
                 1A29  4574 FOUR_BYTES:     CALL    READ_WCS_DATA           ;GET 2 BYTES OF DATA
           CD    1A29               .BYTE   ^0315
        1A4E'    1A2A               .WORD   <READ_WCS_DATA-HEAD>
                 1A2C  4575                 SHLD    DATA2
           22    1A2C               .BYTE   ^042
        00AB'    1A2D               .WORD   <DATA2-HEAD>
                 1A2F  4576
                 1A2F  4577                 CALL    READ_WCS_DATA           ;GET 2 BYTES OF DATA
           CD    1A2F               .BYTE   ^0315
        1A4E'    1A30               .WORD   <READ_WCS_DATA-HEAD>
                 1A32  4578                 SHLD    DATA0
           22    1A32               .BYTE   ^042
        00A9'    1A33               .WORD   <DATA0-HEAD>
                 1A35  4579
                 1A35  4580                 LXI     H,XFER_CNT
           21    1A35               .BYTE   <H*8> ! 1
      05'8D'     1A36               .BYTE   <XFER_CNT-HEAD>&255 , <<XFER_CNT-HEAD>&^XFF00>/256
                 1A38  4581                 CALL    DECR_WORD_R
           CD    1A38               .BYTE   ^0315
        12BC'    1A39               .WORD   <DECR_WORD_R-HEAD>
                 1A3B  4582
                 1A3B  4583                 IFEQ    XFER_CNT,ZERO_WORD,2
           21    1A3B               .BYTE   <H*8> ! 1
      05'8D'     1A3C               .BYTE   <XFER_CNT-HEAD>&255 , <<XFER_CNT-HEAD>&^XFF00>/256
           11    1A3E               .BYTE   <D*8> ! 1
      05'96'     1A3F               .BYTE   <ZERO_WORD-HEAD>&255 , <<ZERO_WORD-HEAD>&^XFF00>/256
        02 0E    1A41               .BYTE   <C*8> ! 6 , 2&255
           CD    1A43               .BYTE   ^0315
        00CF'    1A44               .WORD   <COMPARE-HEAD>
           C2    1A46               .BYTE   ^0302
        1A4D'    1A47               .WORD   <2137$-HEAD>
                 1A49  4584
                 1A49  4585                 CLEAR   MORE_DATA
           AF    1A49               .BYTE   ^0250 ! A               ;with A
           32    1A4A               .BYTE   ^062
        03AF'    1A4B               .WORD   <MORE_DATA-HEAD>
                 1A4D  4586
                 1A4D  4587                 ENDIF
                 1A4D       2137$:                                      ;GENERATE LCL 2137 NAME
                 1A4D  4588
                 1A4D  4589                 RET
           C9    1A4D               .BYTE   ^0311
                 1A4E  4590
                 1A4E  4591
                 1A4E  4592 READ_WCS_DATA:
                 1A4E  4593                 LXI     H,XFER_PNT              ;INC POINTER AND READ DATA
           21    1A4E               .BYTE   <H*8> ! 1
```

```
    05'93' 1A4F             .BYTE   <XFER_PNT-HEAD>&255 , <<XFER_PNT-HEAD>&^XFF00>/256
           1A51  4594               CALL    INC_WORD_R                  ;TO TRANSFER TO WCS
        CD 1A51             .BYTE   ^0315
     12B1' 1A52             .WORD   <INC_WORD_R-HEAD>
           1A54  4595               LHLD    XFER_PNT
        2A 1A54             .BYTE   ^052
     0593' 1A55             .WORD   <XFER_PNT-HEAD>
           1A57  4596               SHLD    WCS_ADDRESS                 ;HIGH VALUE
        22 1A57             .BYTE   ^042
     006C' 1A58             .WORD   <WCS_ADDRESS-HEAD>
           1A5A  4597               CALL    READ_WCS_R
        CD 1A5A             .BYTE   ^0315
     0E6D' 1A5B             .WORD   <READ_WCS_R-HEAD>
           1A5D  4598
           1A5D  4599               LHLD    WCS_VALUE+1
        2A 1A5D             .BYTE   ^052
     00B5' 1A5E             .WORD   <WCS_VALUE+1-HEAD>
           1A60  4600               RET
        C9 1A60             .BYTE   ^0311
           1A61  4601
           1A61  4602
           1A61  4603 ;**************************************************************************
           1A61  4604 ;
           1A61  4605 ;   CLEAR_CPU_ATT_R
           1A61  4606 ;   THIS ROUTINE EXECUTES AN INSTRUCTION IN THE CSR THAT CLEARS
           1A61  4607 ;   BOTH CPU ATTENTION AND CPU ACKNOWLEDGE
           1A61  4608 ;
           1A61  4609 ;**************************************************************************
           1A61  4610
           1A61  4611 CLEAR_CPU_ATT_R:
           1A61  4612               CALL    LOAD_UPC_R                  ;SAVE UPC IN ATT_UPC_SAVE
        CD 1A61             .BYTE   ^0315
     0F19' 1A62             .WORD   <LOAD_UPC_R-HEAD>
           1A64  4613               LXI     H,UPC_VALUE
        21 1A64             .BYTE   <H*8> ! 1
    00'C2' 1A65             .BYTE   <UPC_VALUE-HEAD>&255 , <<UPC_VALUE-HEAD>&^XFF00>/256
           1A67  4614               LXI     D,ATT_UPC_SAVE
        11 1A67             .BYTE   <D*8> ! 1
    00'CC' 1A68             .BYTE   <ATT_UPC_SAVE-HEAD>&255 , <<ATT_UPC_SAVE-HEAD>&^XFF00>/256
           1A6A  4615               CALL    MOVER_3_R
        CD 1A6A             .BYTE   ^0315
     0F5F' 1A6B             .WORD   <MOVER_3_R-HEAD>
           1A6D  4616
           1A6D  4617               LXI     H,X_CLR_CPU_ATT             ;ADDRESS OF INSTRUCTION
        21 1A6D             .BYTE   <H*8> ! 1
    06'6A' 1A6E             .BYTE   <X_CLR_CPU_ATT-HEAD>&255 , <<X_CLR_CPU_ATT-HEAD>&^XFF00>/256
           1A70  4618               CALL    PERFORM_CSR_R
        CD 1A70             .BYTE   ^0315
     12F2' 1A71             .WORD   <PERFORM_CSR_R-HEAD>
           1A73  4619
           1A73  4620               LXI     H,ATT_UPC_SAVE
        21 1A73             .BYTE   <H*8> ! 1
    00'CC' 1A74             .BYTE   <ATT_UPC_SAVE-HEAD>&255 , <<ATT_UPC_SAVE-HEAD>&^XFF00>/256
           1A76  4621               LXI     D,UPC_VALUE
        11 1A76             .BYTE   <D*8> ! 1
    00'C2' 1A77             .BYTE   <UPC_VALUE-HEAD>&255 , <<UPC_VALUE-HEAD>&^XFF00>/256
           1A79  4622               CALL    MOVER_3_R
```

```
      CD  1A79                    .BYTE    ^0315
   0F5F'  1A7A                    .WORD    <MOVER_3_R-HEAD>
          1A7C   4623                      CALL     LOAD_UPC_R
      CD  1A7C                    .BYTE    ^0315
   0F19'  1A7D                    .WORD    <LOAD_UPC_R-HEAD>
          1A7F   4624
          1A7F   4625                      RET
      C9  1A7F                    .BYTE    ^0311
          1A80   4626
          1A80   4627
          1A80   4628 ;*****************************************************************************
          1A80   4629 ;
          1A80   4630 ;   LOAD_SECTION
          1A80   4631 ;   THIS ROUTINE LOADS A SECTION INTO WCS OR INTO CONSOLE RAM
          1A80   4632 ;   IF THE LOAD IS TO WCS A FLAG IS SET AND THE DATA TRANSFER BRANCH
          1A80   4633 ;   AT ADDRESS 0 OF THE WCS IS TAKEN.
          1A80   4634 ;
          1A80   4635 ;*****************************************************************************
          1A80   4636
          1A80   4637 MOV_LOAD_SECTION:
          1A80   4638                      LXI      H,TEMP_FLAG                    ;POINTER TO TEMP SECTION BUFFER
      21  1A80                    .BYTE    <H*8> ! 1
  04'1F'  1A81                    .BYTE    <TEMP_FLAG-HEAD>&255 , <<TEMP_FLAG-HEAD>&^XFF00>/256
          1A83   4639                      LXI      D,SECTION_FLAG                 ;POINTER TO SECTION BUFFER
      11  1A83                    .BYTE    <D*8> ! 1
  08'C9'  1A84                    .BYTE    <SECTION_FLAG-HEAD>&255 , <<SECTION_FLAG-HEAD>&^XFF00>/256
          1A86   4640                      MVI      C,SEC_LEN+1                    ;COUNT
   07 0E  1A86                    .BYTE    <C*8> ! 6 , SEC_LEN+1&255
          1A88   4641                      CALL     MOVER_R                        ;MOVE ENTRIES TO LOCAL BUFFER
      CD  1A88                    .BYTE    ^0315
   0F75'  1A89                    .WORD    <MOVER_R-HEAD>
          1A8B   4642
          1A8B   4643 LOAD_SECTION:        LXI      H,SECTION_NAME
      21  1A8B                    .BYTE    <H*8> ! 1
  08'CA'  1A8C                    .BYTE    <SECTION_NAME-HEAD>&255 , <<SECTION_NAME-HEAD>&^XFF00>/256
          1A8E   4644                      LXI      D,SEC_PARMB_NAM
      11  1A8E                    .BYTE    <D*8> ! 1
   41 07  1A8F                    .BYTE    <SEC_PARMB_NAM-HEAD>&255 , <<SEC_PARMB_NAM-HEAD>&^XFF00>/256
          1A91   4645                      MVI      C,SEC_LEN                      ;MOVE SECTION NAME TO TU58
   06 0E  1A91                    .BYTE    <C*8> ! 6 , SEC_LEN&255
          1A93   4646                      CALL     MOVER_R                        ;PARAMETER BLOCK
      CD  1A93                    .BYTE    ^0315
   0F75'  1A94                    .WORD    <MOVER_R-HEAD>
          1A96   4647
          1A96   4648                      LXI      H,EXT_A                        ;MOVE EXT TO PARM BLOCK
      21  1A96                    .BYTE    <H*8> ! 1
  02'EB'  1A97                    .BYTE    <EXT_A-HEAD>&255 , <<EXT_A-HEAD>&^XFF00>/256
          1A99   4649                      LXI      D,SEC_PARMB_EXT
      11  1A99                    .BYTE    <D*8> ! 1
   41 0D  1A9A                    .BYTE    <SEC_PARMB_EXT-HEAD>&255 , <<SEC_PARMB_EXT-HEAD>&^XFF00>/256
          1A9C   4650                      CALL     MOVER_4_R
      CD  1A9C                    .BYTE    ^0315
   0F73'  1A9D                    .WORD    <MOVER_4_R-HEAD>
          1A9F   4651
          1A9F   4652                      CLEAR    SEC_PARMB_ADD+2
      AF  1A9F                    .BYTE    ^0250 ! A                  ;with A
      32  1AA0                    .BYTE    ^062
   4113  1AA1                  .WORD   <SEC_PARMB_ADD+2-HEAD>
         1AA3  4653                    CLEAR   SEC_PARMB_ADD+3              ;CLR MOST SIG. 2BYTES(UNUSED)
     AF  1AA3                  .BYTE   ^0250 ! A                   ;with A
     32  1AA4                  .BYTE   ^062
   4114  1AA5                  .WORD   <SEC_PARMB_ADD+3-HEAD>
         1AA7  4654
         1AA7  4655                    CLEAR   FAST_WRITE
     AF  1AA7                  .BYTE   ^0250 ! A                   ;with A
     32  1AA8                  .BYTE   ^062
  02FC'  1AA9                  .WORD   <FAST_WRITE-HEAD>
         1AAB  4656                    CLEAR   WCS_LOADED
     AF  1AAB                  .BYTE   ^0250 ! A                   ;with A
     32  1AAC                  .BYTE   ^062
  058B'  1AAD                  .WORD   <WCS_LOADED-HEAD>
         1AAF  4657                    CLEAR   CONSOLE_TEST
     AF  1AAF                  .BYTE   ^0250 ! A                   ;with A
     32  1AB0                  .BYTE   ^062
  0255'  1AB1                  .WORD   <CONSOLE_TEST-HEAD>
         1AB3  4658
         1AB3  4659                    IFMBI   SECTION_FLAG,CON_RAM
     3A  1AB3                  .BYTE   ^072
  08C9'  1AB4                  .WORD   <SECTION_FLAG-HEAD>
     E6  1AB6                  .BYTE   ^0346
     80  1AB7                  .BYTE   CON_RAM
     CA  1AB8                  .BYTE   ^0312
  1AC6'  1AB9                  .WORD   <2138$-HEAD>
         1ABB  4660
         1ABB  4661                    MVI     A,6                           ;DRIVER HAS 6 = RAM LOAD
  06 3E  1ABB                  .BYTE   <A*8> ! 6 , 6&255
         1ABD  4662                    STA     SEC_PARMB_DST                 ;STORE IN DESTINATION CODE
     32  1ABD                  .BYTE   ^062
   4115  1ABE                  .WORD   <SEC_PARMB_DST-HEAD>
         1AC0  4663                    LXI     H,RAM_LOAD_ADD
     21  1AC0                  .BYTE   <H*8> ! 1
  70 00  1AC1                  .BYTE   <RAM_LOAD_ADD-HEAD>&255 , <<RAM_LOAD_ADD-HEAD>&^XFF00>/256
         1AC3  4664
         1AC3  4665                    ELSE
     C3  1AC3                  .BYTE   ^0303
  1ACE'  1AC4                  .WORD   <2139$-HEAD>
         1AC6         2138$:                                                 ;GENERATE LOCAL SYMBOL NAME
         1AC6  4666
         1AC6  4667                    MVI     A,7                           ;DRIVER HAS 7 = WCS LOAD
  07 3E  1AC6                  .BYTE   <A*8> ! 6 , 7&255
         1AC8  4668                    STA     SEC_PARMB_DST                 ;STORE IN DESTINATION CODE
     32  1AC8                  .BYTE   ^062
   4115  1AC9                  .WORD   <SEC_PARMB_DST-HEAD>
         1ACB  4669                    LXI     H,WCS_LOAD_ADD
     21  1ACB                  .BYTE   <H*8> ! 1
  00 00  1ACC                  .BYTE   <WCS_LOAD_ADD-HEAD>&255 , <<WCS_LOAD_ADD-HEAD>&^XFF00>/256
         1ACE  4670
         1ACE  4671                    ENDIF
         1ACE         2139$:                                                 ;GENERATE LCL 2139 NAME
         1ACE  4672
         1ACE  4673                    SHLD    SEC_PARMB_ADD                 ;STORE LOAD ADDR IN PARM BLOCK
     22  1ACE                  .BYTE   ^042
   4111  1ACF                  .WORD   <SEC_PARMB_ADD-HEAD>
         1AD1  4674
```

```
              1AD1   4675                   LDA     SEC_PARMB_DEF              ;GET DEFAULT TU58 UNIT (THIS
        3A    1AD1                 .BYTE    ^072
      4150    1AD2                 .WORD    <SEC_PARMB_DEF-HEAD>
              1AD4   4676                                                      ; UNIT)
              1AD4   4677                   STA     SEC_PARMB_UNIT             ;PARM BLOCK ADDRESS FOR UNIT
        32    1AD4                 .BYTE    ^062
      4106    1AD5                 .WORD    <SEC_PARMB_UNIT-HEAD>
              1AD7   4678
              1AD7   4679                   CALL    TU58_DRIVER                ;GET THE FILE
        CD    1AD7                 .BYTE    ^0315
      4117    1AD8                 .WORD    <TU58_DRIVER-HEAD>
              1ADA   4680                   OUT     DISMEM                     ;DISABLE MEM REF (TU58 DRIVER
     A7 D3    1ADA                 .BYTE    ^0323 , DISMEM&255        ;register A
              1ADC   4681                                                      ; ENABLED IT AFTER LOAD)
              1ADC   4682
              1ADC   4683                   IFNEQI  SEC_PARMB_ERR,0            ;CHECK FOR TU58 ERROR
        3A    1ADC                 .BYTE    ^072
      4116    1ADD                 .WORD    <SEC_PARMB_ERR-HEAD>
        FE    1ADF                 .BYTE    ^0376
        00    1AE0                 .BYTE    0
        CA    1AE1                 .BYTE    ^0312
     1AF5'    1AE2                 .WORD    <2140$-HEAD>
              1AE4   4684
              1AE4   4685                   CLEAR   FAST_WRITE
        AF    1AE4                 .BYTE    ^0250 ! A                 ;with A
        32    1AE5                 .BYTE    ^062
     02FC'    1AE6                 .WORD    <FAST_WRITE-HEAD>
              1AE8   4686                   CLEAR   WCS_LOADED
        AF    1AE8                 .BYTE    ^0250 ! A                 ;with A
        32    1AE9                 .BYTE    ^062
     058B'    1AEA                 .WORD    <WCS_LOADED-HEAD>
              1AEC   4687                   CLEAR   EXECUTE                    ;ALLOW PARSER TO PROMPT
        AF    1AEC                 .BYTE    ^0250 ! A                 ;with A
        32    1AED                 .BYTE    ^062
     02EA'    1AEE                 .WORD    <EXECUTE-HEAD>
              1AF0   4688                   MVI     B,<^X25>
     25 06    1AF0                 .BYTE    <B*8> ! 6 , ^X25&255
              1AF2   4689                   JMP     ERROR_ROUTINE_NO_RET       ;TU58 ERROR.  DON'T RETURN
        C3    1AF2                 .BYTE    ^0303
     0C45'    1AF3                 .WORD    <ERROR_ROUTINE_NO_RET-HEAD>
              1AF5   4690                   ENDIF
              1AF5         2140$:                                              ;GENERATE LCL 2140 NAME
              1AF5   4691
              1AF5   4692                   SET     FILE_LOADED                ;SECTION WAS LOADED OK
        AF    1AF5                 .BYTE    ^0250 ! A                 ;with A
        3C    1AF6                 .BYTE    ^04 ! <8*A>
        32    1AF7                 .BYTE    ^062
     02FD'    1AF8                 .WORD    <FILE_LOADED-HEAD>
              1AFA   4693
              1AFA   4694                   IFMBI   SECTION_FLAG,CON_RAM
        3A    1AFA                 .BYTE    ^072
     08C9'    1AFB                 .WORD    <SECTION_FLAG-HEAD>
        E6    1AFD                 .BYTE    ^0346
        80    1AFE                 .BYTE    CON_RAM
        CA    1AFF                 .BYTE    ^0312
     1B0A'    1B00                 .WORD    <2141$-HEAD>
              1B02   4695                   SET     CONSOLE_TEST
     AF  1B02                  .BYTE    ^0250 ! A              ;with A
     3C  1B03                  .BYTE    ^04 ! <8*A>
     32  1B04                  .BYTE    ^062
  0255'  1B05                  .WORD    <CONSOLE_TEST-HEAD>
         1B07  4696
         1B07  4697                     ELSE
     C3  1B07                  .BYTE    ^0303
  1B15'  1B08                  .WORD    <2142$-HEAD>
         1B0A        2141$:                                             ;GENERATE LOCAL SYMBOL NAME
         1B0A  4698                     SET     WCS_LOADED
     AF  1B0A                  .BYTE    ^0250 ! A              ;with A
     3C  1B0B                  .BYTE    ^04 ! <8*A>
     32  1B0C                  .BYTE    ^062
  058B'  1B0D                  .WORD    <WCS_LOADED-HEAD>
         1B0F  4699                     CALL    EXEC_TESTO
     CD  1B0F                  .BYTE    ^0315
  1BA1'  1B10                  .WORD    <EXEC_TESTO-HEAD>
         1B12  4700                     CALL    NOP_CSR_R
     CD  1B12                  .BYTE    ^0315
  0ECA'  1B13                  .WORD    <NOP_CSR_R-HEAD>
         1B15  4701
         1B15  4702                     ENDIF
         1B15        2142$:                                             ;GENERATE LCL 2142 NAME
         1B15  4703
         1B15  4704                     RET
     C9  1B15                  .BYTE    ^0311
         1B16  4705
         1B16  4706
         1B16  4707  ;*****************************************************************************
         1B16  4708  ;
         1B16  4709  ;  VERIFY_WRITER
         1B16  4710  ;  THIS ROUTINE SINGLE STEPS THROUGH THE WRITE DATA 32 MICRO CODE
         1B16  4711  ;  AND COMPARES IT TO AN EXPECTED VALUE TABLE
         1B16  4712  ;
         1B16  4713  ;*****************************************************************************
         1B16  4714
         1B16  4715  VERIFY_WRITER:
         1B16  4716                     SET     FAST_WRITE                ;ERROR WILL CLEAR FAST WRITE
     AF  1B16                  .BYTE    ^0250 ! A              ;with A
     3C  1B17                  .BYTE    ^04 ! <8*A>
     32  1B18                  .BYTE    ^062
  02FC'  1B19                  .WORD    <FAST_WRITE-HEAD>
         1B1B  4717                     LXI     H,WCS_DAT_32_ADD
     21  1B1B                  .BYTE    <H*8> ! 1
  06 00  1B1C                  .BYTE    <WCS_DAT_32_ADD-HEAD>&255 , <<WCS_DAT_32_ADD-HEAD>&^XFF00>/256
         1B1E  4718                     MOV     A,H
     7C  1B1E                  .BYTE    ^0100 ! <A*8> ! H
         1B1F  4719                     MOV     H,L
     65  1B1F                  .BYTE    ^0100 ! <H*8> ! L
         1B20  4720                     MOV     L,A
     6F  1B20                  .BYTE    ^0100 ! <L*8> ! A
         1B21  4721                     SHLD    UPC_VALUE
     22  1B21                  .BYTE    ^042
  00C2'  1B22                  .WORD    <UPC_VALUE-HEAD>
         1B24  4722                     CALL    LOAD_UPC_R
     CD  1B24                  .BYTE    ^0315
  0F19'  1B25                  .WORD    <LOAD_UPC_R-HEAD>
```

```
                1B27  4723
                1B27  4724                      CALL    NOP_CSR_R
          CD    1B27                   .BYTE    ^0315
       0ECA'    1B28                   .WORD    <NOP_CSR_R-HEAD>
                1B2A  4725                      LXI     H,WRITE_TAB
          21    1B2A                   .BYTE    <H*8> ! 1
      09'21'    1B2B                   .BYTE    <WRITE_TAB-HEAD>&255 , <<WRITE_TAB-HEAD>&^XFF00>/256
                1B2D  4726                      SHLD    WRITE_TAB_PNT
          22    1B2D                   .BYTE    ^042
       006F'    1B2E                   .WORD    <WRITE_TAB_PNT-HEAD>
                1B30  4727                      OUT     CLRATN
       AB D3    1B30                   .BYTE    ^0323 , CLRATN&255       ;register A
                1B32  4728
                1B32  4729                      DO      5
          21    1B32                   .BYTE    <H*8> ! 1
      00'55'    1B33                   .BYTE    <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
          46    1B35                   .BYTE    ^0100 ! <B*8> ! M
          C5    1B36                   .BYTE    ^0305 ! <8*B>
       05 3E    1B37                   .BYTE    <A*8> ! 6 , 5&255
          77    1B39                   .BYTE    ^0100 ! <M*8> ! A
                1B3A        2143$:
                1B3A  4730
                1B3A  4731                      CALL    MICRO_STEP_CPU_R
          CD    1B3A                   .BYTE    ^0315
       12A0'    1B3B                   .WORD    <MICRO_STEP_CPU_R-HEAD>
                1B3D  4732                      CALL    CHECK_UPC
          CD    1B3D                   .BYTE    ^0315
       1B73'    1B3E                   .WORD    <CHECK_UPC-HEAD>
                1B40  4733
                1B40  4734                      LDA     FAST_WRITE                  ;GET FAST WRITE FLAG
          3A    1B40                   .BYTE    ^072
       02FC'    1B41                   .WORD    <FAST_WRITE-HEAD>
                1B43  4735                      ORA     A                           ;SET CONDITION CODES
          B7    1B43                   .BYTE    ^0260 ! A
                1B44  4736                      JZ      LEAVE_DO                    ;LEAVE DO LOOP IF FAST_WRITE
          CA    1B44                   .BYTE    ^0312
       1B71'    1B45                   .WORD    <LEAVE_DO-HEAD>
                1B47  4737                                                          ; CLEAR
                1B47  4738                      ENDDO
          21    1B47                   .BYTE    <H*8> ! 1
      00'55'    1B48                   .BYTE    <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
          35    1B4A                   .BYTE    ^05 ! <8*M>
          C2    1B4B                   .BYTE    ^0302
       1B3A'    1B4C                   .WORD    <2143$-HEAD>
          C1    1B4E                   .BYTE    ^0301 ! <8*B>
          70    1B4F                   .BYTE    ^0100 ! <M*8> ! B
                1B50  4739
                1B50  4740                      OUT     SETATN
       AA D3    1B50                   .BYTE    ^0323 , SETATN&255       ;register A
                1B52  4741
                1B52  4742                      DO      3
          21    1B52                   .BYTE    <H*8> ! 1
      00'55'    1B53                   .BYTE    <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
          46    1B55                   .BYTE    ^0100 ! <B*8> ! M
          C5    1B56                   .BYTE    ^0305 ! <8*B>
       03 3E    1B57                   .BYTE    <A*8> ! 6 , 3&255
          77    1B59                   .BYTE    ^0100 ! <M*8> ! A
```

```
             1B5A        2144$:
             1B5A  4743
             1B5A  4744                   CALL    MICRO_STEP_CPU_R
       CD    1B5A                .BYTE    ^0315
    12A0'    1B5B                .WORD    <MICRO_STEP_CPU_R-HEAD>
             1B5D  4745                   CALL    CHECK_UPC
       CD    1B5D                .BYTE    ^0315
    1B73'    1B5E                .WORD    <CHECK_UPC-HEAD>
             1B60  4746
             1B60  4747                   LDA     FAST_WRITE                 ;GET FAST WRITE FLAG
       3A    1B60                .BYTE    ^072
    02FC'    1B61                .WORD    <FAST_WRITE-HEAD>
             1B63  4748                   ORA     A                          ;SET CONDITION CODES
       B7    1B63                .BYTE    ^0260 ! A
             1B64  4749                   JZ      LEAVE_DO                   ;LEAVE DO LOOP IF FAST_WRITE
       CA    1B64                .BYTE    ^0312
    1B71'    1B65                .WORD    <LEAVE_DO-HEAD>
             1B67  4750                                                      ; CLEAR
             1B67  4751                   ENDDO
       21    1B67                .BYTE    <H*8> ! 1
   00'55'    1B68                .BYTE    <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
       35    1B6A                .BYTE    ^05 ! <8*M>
       C2    1B6B                .BYTE    ^0302
    1B5A'    1B6C                .WORD    <2144$-HEAD>
       C1    1B6E                .BYTE    ^0301 ! <8*B>
       70    1B6F                .BYTE    ^0100 ! <M*8> ! B
             1B70  4752
             1B70  4753                   RET
       C9    1B70                .BYTE    ^0311
             1B71  4754
             1B71  4755 LEAVE_DO:         POP     B                          ;POP STACK SINCE DO-LOOP DID
       C1    1B71                .BYTE    ^0301 ! <8*B>
             1B72  4756                                                      ; A PUSH
             1B72  4757                   RET                                ;AND RETURN
       C9    1B72                .BYTE    ^0311
             1B73  4758
             1B73  4759 ;***************************************************************************************
             1B73  4760 ;
             1B73  4761 ;  CHECK_UPC:
             1B73  4762 ;  THIS ROUTINE COMPARE THE UPC VALUE FROM THE TABLE AND THE VALUE IN
             1B73  4763 ;  THE UPC AT THE TIME IT IS CALLED.
             1B73  4764 ;
             1B73  4765 ;  INPUTCONDITION:
             1B73  4766 ;       WRITE_TAB_PNT = POINTS TO THE TABLE VALUE
             1B73  4767 ;
             1B73  4768 ;  OUTPUT CONDITION:
             1B73  4769 ;       WRITE_TAB_PNT IS INCREMENTED TO THE NEXT TABLE VALUE
             1B73  4770 ;
             1B73  4771 ;***************************************************************************************
             1B73  4772
             1B73  4773 CHECK_UPC:        CALL    LOAD_UPC_R
       CD    1B73                .BYTE    ^0315
    0F19'    1B74                .WORD    <LOAD_UPC_R-HEAD>
             1B76  4774                   LHLD    WRITE_TAB_PNT
       2A    1B76                .BYTE    ^052
    006F'    1B77                .WORD    <WRITE_TAB_PNT-HEAD>
             1B79  4775                   MOV     A,M
```

```
        7E  1B79                .BYTE   ^0100 ! <A*8> ! M
            1B7A   4776                 STA     UPC_COMPARE+1
        32  1B7A                .BYTE   ^062
     00CB'  1B7B                .WORD   <UPC_COMPARE+1-HEAD>
            1B7D   4777                 INX     H
        23  1B7D                .BYTE   <H*8> ! 3
            1B7E   4778                 MOV     A,M
        7E  1B7E                .BYTE   ^0100 ! <A*8> ! M
            1B7F   4779                 STA     UPC_COMPARE
        32  1B7F                .BYTE   ^062
     00CA'  1B80                .WORD   <UPC_COMPARE-HEAD>
            1B82   4780                 INX     H
        23  1B82                .BYTE   <H*8> ! 3
            1B83   4781                 SHLD    WRITE_TAB_PNT
        22  1B83                .BYTE   ^042
     006F'  1B84                .WORD   <WRITE_TAB_PNT-HEAD>
            1B86   4782
            1B86   4783                 IFNEQ   UPC_COMPARE,UPC_VALUE,2
        21  1B86                .BYTE   <H*8> ! 1
   00'CA'   1B87                .BYTE   <UPC_COMPARE-HEAD>&255 , <<UPC_COMPARE-HEAD>&^XFF00>/256
        11  1B89                .BYTE   <D*8> ! 1
   00'C2'   1B8A                .BYTE   <UPC_VALUE-HEAD>&255 , <<UPC_VALUE-HEAD>&^XFF00>/256
     02 0E  1B8C                .BYTE   <C*8> ! 6 , 2&255
        CD  1B8E                .BYTE   ^0315
     00CF'  1B8F                .WORD   <COMPARE-HEAD>
        CA  1B91                .BYTE   ^0312
     1B9D'  1B92                .WORD   <2145$-HEAD>
            1B94   4784                 MVI     B,<^X29>
     29 06  1B94                .BYTE   <B*8> ! 6 , ^X29&255
            1B96   4785                 CALL    ERROR_ROUTINE
        CD  1B96                .BYTE   ^0315
     0C4A'  1B97                .WORD   <ERROR_ROUTINE-HEAD>
            1B99   4786                 CLEAR   FAST_WRITE
        AF  1B99                .BYTE   ^0250 ! A                       ;with A
        32  1B9A                .BYTE   ^062
     02FC'  1B9B                .WORD   <FAST_WRITE-HEAD>
            1B9D   4787
            1B9D   4788                 ENDIF
            1B9D           2145$:                                          ;GENERATE LCL 2145 NAME
            1B9D   4789
            1B9D   4790                 CALL    LOAD_UPC_R
        CD  1B9D                .BYTE   ^0315
     0F19'  1B9E                .WORD   <LOAD_UPC_R-HEAD>
            1BA0   4791
            1BA0   4792                 RET
        C9  1BA0                .BYTE   ^0311
            1BA1   4793
            1BA1   4794 ;*********************************************************************************
            1BA1   4795 ;
            1BA1   4796 ;   EXEC_TEST0
            1BA1   4797 ;   THIS ROUTINE EXECUTES TEST ZERO OF A WCS IMAGE ONLY IF FILE LOADED
            1BA1   4798 ;   IS SET.  TEST ZERO IS CONTINUED EACH TIME A DATA REQUEST IS RETURNED
            1BA1   4799 ;   WHEN A DATA REQUEST IS NOT RETURNED THEN EXECUTION OF TEST 0 STOPS
            1BA1   4800 ;
            1BA1   4801 ;*********************************************************************************
            1BA1   4802
            1BA1   4803 EXEC_TEST0:     MVI     B,<^X2A>                ;ERROR CODE IF WCS NOT LOADED
```

```
  2A 06  1BA1                .BYTE   <B*8> ! 6 , ^X2A&255
         1BA3  4804                  CALL    CHECK_WCS_LOADED          ;CHECK FOR WCS LOADED SET
     CD  1BA3                .BYTE   ^0315
  0C2A'  1BA4                .WORD   <CHECK_WCS_LOADED-HEAD>
         1BA6  4805                                                    ; RETURN IF OK
         1BA6  4806
         1BA6  4807                  IFN     NOINIT                    ;ELSE CHECK NO INIT FLAG
     3A  1BA6                .BYTE   ^072
  03BE'  1BA7                .WORD   <NOINIT-HEAD>
     0F  1BA9                .BYTE   ^017
     DA  1BAA                .BYTE   ^0332
  1BDF'  1BAB                .WORD   <2146$-HEAD>
         1BAD  4808
         1BAD  4809                  CALL    VERIFY_WRITER             ;CHECK DATA XFER ROUTINE
     CD  1BAD                .BYTE   ^0315
  1B16'  1BAE                .WORD   <VERIFY_WRITER-HEAD>
         1BB0  4810
         1BB0  4811                  CLEAR   STARTING_UPC
     AF  1BB0                .BYTE   ^0250 ! A              ;with A
     32  1BB1                .BYTE   ^062
  0407'  1BB2                .WORD   <STARTING_UPC-HEAD>
         1BB4  4812                  CLEAR   STARTING_UPC+1            ;SET TO EXECUTE DATA XFER
     AF  1BB4                .BYTE   ^0250 ! A              ;with A
     32  1BB5                .BYTE   ^062
  0408'  1BB6                .WORD   <STARTING_UPC+1-HEAD>
         1BB8  4813
         1BB8  4814                  WHILER  DATA_XFER_FLG             ;FLAG SET IF DATA XFER EVENT
     AF  1BB8                .BYTE   ^0250 ! A              ;with A
     3C  1BB9                .BYTE   ^04 ! <8*A>
     32  1BBA                .BYTE   ^062
  025E'  1BBB                .WORD   <DATA_XFER_FLG-HEAD>
         1BBD          4004$: LDA    DATA_XFER_FLG
     3A  1BBD                .BYTE   ^072
  025E'  1BBE                .WORD   <DATA_XFER_FLG-HEAD>
     0F  1BC0                .BYTE   ^017
     D2  1BC1                .BYTE   ^0322
  1BDF'  1BC2                .WORD   <2147$-HEAD>
         1BC4  4815                                                    ;LOOP STOPS IF NO EVENT
         1BC4  4816                  CALL    START_CPU
     CD  1BC4                .BYTE   ^0315
  10FF'  1BC5                .WORD   <START_CPU-HEAD>
         1BC7  4817                  SET     TEST_ZERO                 ;SET FOR NO RESTART
     AF  1BC7                .BYTE   ^0250 ! A              ;with A
     3C  1BC8                .BYTE   ^04 ! <8*A>
     32  1BC9                .BYTE   ^062
  0447'  1BCA                .WORD   <TEST_ZERO-HEAD>
         1BCC  4818                  CALL    ATTENTION                 ;WAIT FOR CPU ATTENTIONS
     CD  1BCC                .BYTE   ^0315
  1321'  1BCD                .WORD   <ATTENTION-HEAD>
         1BCF  4819                  CLEAR   TEST_ZERO
     AF  1BCF                .BYTE   ^0250 ! A              ;with A
     32  1BD0                .BYTE   ^062
  0447'  1BD1                .WORD   <TEST_ZERO-HEAD>
         1BD3  4820                  CALL    RESTORE_WR
     CD  1BD3                .BYTE   ^0315
  0C0A'  1BD4                .WORD   <RESTORE_WR-HEAD>
         1BD6  4821
```

```
          1BD6  4822                   LHLD    UPC_SUB                         ;SET FOR CONTINUE AT NEXT ADDR.
      2A  1BD6                 .BYTE   ^052
   00C6'  1BD7                 .WORD   <UPC_SUB-HEAD>
          1BD9  4823                   SHLD    STARTING_UPC
      22  1BD9                 .BYTE   ^042
   0407'  1BDA                 .WORD   <STARTING_UPC-HEAD>
          1BDC  4824
          1BDC  4825                   ENDWHILE
      C3  1BDC                 .BYTE   ^0303
   1BBD'  1BDD                 .WORD   <4004$-HEAD>
          1BDF          2147$:                                                 ;GENERATE LCL 2147 NAME
          1BDF  4826
          1BDF  4827                   ENDIF
          1BDF          2146$:                                                 ;GENERATE LCL 2146 NAME
          1BDF  4828
          1BDF  4829                   RET
      C9  1BDF                 .BYTE   ^0311
          1BE0  4830
          1BE0  4831
          1BE0  4832  ;****************************************************************************
          1BE0  4833  ;
          1BE0  4834  ;   SYNTAX_ERROR
          1BE0  4835  ;   THIS ROUTINE PRINTS "SYNTAX ERROR"
          1BE0  4836  ;
          1BE0  4837  ;****************************************************************************
          1BE0  4838
          1BE0  4839  SYNTAX_ERROR:
          1BE0  4840                   CLEAR   NOT_FOUND
      AF  1BE0                 .BYTE   ^0250 ! A                     ;with A
      32  1BE1                 .BYTE   ^062
   03C2'  1BE2                 .WORD   <NOT_FOUND-HEAD>
          1BE4  4841                   CLEAR   EXECUTE                         ;PARSER WILL PROMPT FOR COMMAND
      AF  1BE4                 .BYTE   ^0250 ! A                     ;with A
      32  1BE5                 .BYTE   ^062
   02EA'  1BE6                 .WORD   <EXECUTE-HEAD>
          1BE8  4842                   RET
      C9  1BE8                 .BYTE   ^0311
          1BE9  4843
          1BE9  4844
          1BE9  4845  ;****************************************************************************
          1BE9  4846  ;
          1BE9  4847  ;   CHECKSUM
          1BE9  4848  ;   THIS ROUTINE CHECKSUMS THE PROGRAM AREA  (NOT THE VARIABLE AREA)
          1BE9  4849  ;   THE CHECKSUM IS LEFT IN NEWSUM
          1BE9  4850  ;
          1BE9  4851  ;****************************************************************************
          1BE9  4852
          1BE9  4853  CHECKSUM:        LXI     H,BEGIN_CHECKSUM
      21  1BE9                 .BYTE   <H*8> ! 1
  09'8A'  1BEA                 .BYTE   <BEGIN_CHECKSUM-HEAD>&255 , <<BEGIN_CHECKSUM-HEAD>&^XFF00>/256
          1BEC  4854                   LXI     D,END_CHECKSUM
      11  1BEC                 .BYTE   <D*8> ! 1
  1F'FD'  1BED                 .BYTE   <END_CHECKSUM-HEAD>&255 , <<END_CHECKSUM-HEAD>&^XFF00>/256
          1BEF  4855                   CLEAR   NEWSUM
      AF  1BEF                 .BYTE   ^0250 ! A                     ;with A
      32  1BF0                 .BYTE   ^062
   03BC'  1BF1                 .WORD   <NEWSUM-HEAD>
```

```
         1BF3  4856 1$:                 LDA     NEWSUM
     3A  1BF3                   .BYTE   ^072
  03BC'  1BF4                   .WORD   <NEWSUM-HEAD>
         1BF6  4857                     ADD     M
     86  1BF6                   .BYTE   ^0200 ! M
         1BF7  4858                     INX     H
     23  1BF7                   .BYTE   <H*8> ! 3
         1BF8  4859                     STA     NEWSUM
     32  1BF8                   .BYTE   ^062
  03BC'  1BF9                   .WORD   <NEWSUM-HEAD>
         1BFB  4860                     MOV     A,H
     7C  1BFB                   .BYTE   ^0100 ! <A*8> ! H
         1BFC  4861                     CMP     D
     BA  1BFC                   .BYTE   ^0270 ! D
         1BFD  4862                     JNZ     1$
     C2  1BFD                   .BYTE   ^0302
  1BF3'  1BFE                   .WORD   <1$-HEAD>
         1C00  4863                     MOV     A,L
     7D  1C00                   .BYTE   ^0100 ! <A*8> ! L
         1C01  4864                     CMP     E
     BB  1C01                   .BYTE   ^0270 ! E
         1C02  4865                     JNZ     1$
     C2  1C02                   .BYTE   ^0302
  1BF3'  1C03                   .WORD   <1$-HEAD>
         1C05  4866                     RET
     C9  1C05                   .BYTE   ^0311
         1C06  4867
         1C06  4868
         1C06  4869 ;*************************************************************************
         1C06  4870 ;
         1C06  4871 ;   SET_PARDONE
         1C06  4872 ;   THIS ROUTINE SETS THE FLAG PARDONE SO THAT RE-ENTRANT PARSING
         1C06  4873 ;   ROUTINES(SUCH AS DIAGNOSE) KNOW THEY HAVE HAVE END OF LINE.
         1C06  4874 ;
         1C06  4875 ;*************************************************************************
         1C06  4876
         1C06  4877 SET_PARDONE:        SET     PARDONE
     AF  1C06                   .BYTE   ^0250 ! A                       ;with A
     3C  1C07                   .BYTE   ^04 ! <8*A>
     32  1C08                   .BYTE   ^062
  03D9'  1C09                   .WORD   <PARDONE-HEAD>
         1C0B  4878                     RET
     C9  1C0B                   .BYTE   ^0311
         1C0C  4879
         1C0C  4880
         1C0C  4881 ;*************************************************************************
         1C0C  4882 ;
         1C0C  4883 ;   POWER_REC
         1C0C  4884 ;   THIS ROUTINE IS BRANCHED TO ON A POWER RECOVERY
         1C0C  4885 ;   IT WILL CALL THE ROM CODE THAT DOES POWER UP SEQUENCING AND WILL
         1C0C  4886 ;   DO AN INITIALIZE IF THERE IS WCS CODE LOADED
         1C0C  4887 ;
         1C0C  4888 ;*************************************************************************
         1C0C  4889
         1C0C  4890 POWER_REC:          CALL    POWER_SEQ               ;CALL ROM POWER SEQ ROUTINE
     CD  1C0C                   .BYTE   ^0315
  001B   1C0D                   .WORD   <POWER_SEQ-HEAD>
```

```
              1C0F  4891                                                      ;THE FOLLOWING DELAY LOOP
              1C0F  4892                                                      ; IS TO ALLOW AC LOW TO
              1C0F  4893                                                      ; SETTLE BEFORE RE-ENABLING
              1C0F  4894                                                      ; INTERRUPTS
              1C0F  4895                                                      ;INIT COUNTER IN H&L TO 0
              1C0F  4896                     LXI     H,0
         21   1C0F              .BYTE        <H*8> ! 1
      00 00   1C10              .BYTE        0&255 , <0&^XFF00>/256
              1C12  4897 1$:                 DCX     H                        ;DECREMENT COUNTER
         2B   1C12              .BYTE        <H*8> ! 11
              1C13  4898                     MOV     A,H                      ;GET HIGH BYTE RESULT
         7C   1C13              .BYTE        ^0100 ! <A*8> ! H
              1C14  4899                     ORA     L                        ;'OR' WITH LOW BYTE
         B5   1C14              .BYTE        ^0260 ! L
              1C15  4900                     JNZ     1$                       ;REPEAT IF NOT 0
         C2   1C15              .BYTE        ^0302
      1C12'   1C16              .WORD        <1$-HEAD>
              1C18  4901
              1C18  4902                     MVI     A,HEX_10                 ;A GETS A 10(H)
      10 3E   1C18              .BYTE        <A*8> ! 6 , HEX_10&255
              1C1A  4903                     SIM                              ;RESET 7.5
         30   1C1A              .BYTE        ^060
              1C1B  4904
              1C1B  4905                     SET     WARM_RESTART             ;INDICATE POWER FAIL RESTART
         AF   1C1B              .BYTE        ^0250 ! A                  ;with A
         3C   1C1C              .BYTE        ^04 ! <8*A>
         32   1C1D              .BYTE        ^062
      04B3'   1C1E              .WORD        <WARM_RESTART-HEAD>
              1C20  4906                     JMP     START_UP
         C3   1C20              .BYTE        ^0303
      1CD2'   1C21              .WORD        <START_UP-HEAD>
              1C23  4907
              1C23  4908 ;**************************************************************************
              1C23  4909 ;
              1C23  4910 ;  TIMER_VEC
              1C23  4911 ;
              1C23  4912 ;       THIS ROUTINE WILL HANDLE A INTERVAL TIMER INTERRUPT IF THE INTERRUPT
              1C23  4913 ;       IS NOT MASKED OUT.  AT PRESENT, THIS ROUTINE WILL NOT BE ENTERED AND
              1C23  4914 ;       DOES NOTHING.  THIS ROUTINE WILL BE WRITTEN AT A LATER TIME IF NECES-
              1C23  4915 ;       SARY.
              1C23  4916 ;
              1C23  4917 ;**************************************************************************
              1C23  4918
              1C23  4919 TIMER_VEC:           RET                              ;DO A RETURN
         C9   1C23              .BYTE        ^0311
              1C24  4920
              1C24  4921 ;**************************************************************************
              1C24  4922 ;
              1C24  4923 ;  AUTO_TEST
              1C24  4924 ;
              1C24  4925 ;       THIS ROUTINE WILL HANDLE INSTUCTION FLOW WHILE RUNNING MICMON UNDER
              1C24  4926 ;       CUSTOMER RUNABLE DIAGNOSTICS AUTO MODE
              1C24  4927 ;
              1C24  4928 ;**************************************************************************
              1C24  4929
              1C24  4930 AUTO_TEST:           CLEAR   ERROR
         AF   1C24              .BYTE        ^0250 ! A                  ;with A
      32  1C25               .BYTE   ^062
   02E2'  1C26               .WORD   <ERROR-HEAD>
          1C28  4931
          1C28  4932                 IF      PACK_ERROR                    ;IF WRONG RL02 PACK WAS FOUND
      3A  1C28               .BYTE   ^072
   03D5'  1C29               .WORD   <PACK_ERROR-HEAD>
      0F  1C2B               .BYTE   ^017
      D2  1C2C               .BYTE   ^0322
   1C47'  1C2D               .WORD   <2148$-HEAD>
          1C2F  4933                 LXI     H,RETRY_IDC2                  ; THEN RESTART TEST
      21  1C2F               .BYTE   <H*8> ! 1
  03'F2'  1C30               .BYTE   <RETRY_IDC2-HEAD>&255 , <<RETRY_IDC2-HEAD>&^XFF00>/256
          1C32  4934                 LXI     D,TTBUF                       ;MOVE INSTRUCTION INTO TTBUF
      11  1C32               .BYTE   <D*8> ! 1
  08'D1'  1C33               .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1C35  4935                 MVI     C,12
   0C 0E  1C35               .BYTE   <C*8> ! 6 , 12&255
          1C37  4936                 CALL    MOVER_R
      CD  1C37               .BYTE   ^0315
   0F75'  1C38               .WORD   <MOVER_R-HEAD>
          1C3A  4937
          1C3A  4938                 LXI     H,TTBUF                       ;INIT TTY BUFFER POINTER
      21  1C3A               .BYTE   <H*8> ! 1
  08'D1'  1C3B               .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1C3D  4939                 SHLD    TTBUF_PNT
      22  1C3D               .BYTE   ^042
   044D'  1C3E               .WORD   <TTBUF_PNT-HEAD>
          1C40  4940                 CLEAR   PACK_ERROR
      AF  1C40               .BYTE   ^0250 ! A               ;with A
      32  1C41               .BYTE   ^062
   03D5'  1C42               .WORD   <PACK_ERROR-HEAD>
          1C44  4941
          1C44  4942                 ELSE
      C3  1C44               .BYTE   ^0303
   1CCA'  1C45               .WORD   <2149$-HEAD>
          1C47        2148$:                                           ;GENERATE LOCAL SYMBOL NAME
          1C47  4943                 LHLD    INSTR_PNT                     ;MOVE FIRST BYTE OF INSTRUCTION
      2A  1C47               .BYTE   ^052
   0345'  1C48               .WORD   <INSTR_PNT-HEAD>
          1C4A  4944                 MOV     A,M                           ; TO A
      7E  1C4A               .BYTE   ^0100 ! <A*8> ! M
          1C4B  4945                 RAR                                   ;ROTATE FIRST BIT INTO CARRY
      1F  1C4B               .BYTE   ^037
          1C4C  4946
          1C4C  4947                 IFC                                   ;BIT 0 SET TELLS TO PRINT
      D2  1C4C               .BYTE   ^0322
   1C57'  1C4D               .WORD   <2150$-HEAD>
          1C4F  4948                 SET     PRINT_START                   ;'TESTING STARTED' MESSAGE
      AF  1C4F               .BYTE   ^0250 ! A               ;with A
      3C  1C50               .BYTE   ^04 ! <8*A>
      32  1C51               .BYTE   ^062
   03F0'  1C52               .WORD   <PRINT_START-HEAD>
          1C54  4949                 ELSE
      C3  1C54               .BYTE   ^0303
   1C5B'  1C55               .WORD   <2151$-HEAD>
          1C57        2150$:                                           ;GENERATE LOCAL SYMBOL NAME
          1C57  4950                 CLEAR   PRINT_START                   ;BIT 0 CLEAR TELLS TO NOT PRINT
      AF  1C57                .BYTE   ^0250 ! A                       ;with A
      32  1C58                .BYTE   ^062
   03F0'  1C59                .WORD   <PRINT_START-HEAD>
          1C5B   4951                 ENDIF
          1C5B         2151$:                                          ;GENERATE LCL 2151 NAME
          1C5B   4952
          1C5B   4953                 LHLD    INSTR_PNT                ;LOOK AT SECOND BIT
      2A  1C5B                .BYTE   ^052
   0345'  1C5C                .WORD   <INSTR_PNT-HEAD>
          1C5E   4954                 MOV     A,M
      7E  1C5E                .BYTE   ^0100 ! <A*8> ! M
          1C5F   4955                 RAR
      1F  1C5F                .BYTE   ^037
          1C60   4956                 RAR
      1F  1C60                .BYTE   ^037
          1C61   4957
          1C61   4958                 IFC                              ;BIT 1 SET TELLS TO PRINT
      D2  1C61                .BYTE   ^0322
   1C6C'  1C62                .WORD   <2152$-HEAD>
          1C64   4959                 SET     PRINT_PASS               ; 'PASSED' MESSAGE
      AF  1C64                .BYTE   ^0250 ! A                       ;with A
      3C  1C65                .BYTE   ^04 ! <8*A>
      32  1C66                .BYTE   ^062
   03ED'  1C67                .WORD   <PRINT_PASS-HEAD>
          1C69   4960                 ELSE
      C3  1C69                .BYTE   ^0303
   1C70'  1C6A                .WORD   <2153$-HEAD>
          1C6C         2152$:                                          ;GENERATE LOCAL SYMBOL NAME
          1C6C   4961                 CLEAR   PRINT_PASS               ;BIT 1 CLEAR TELLS TO NOT PRINT
      AF  1C6C                .BYTE   ^0250 ! A                       ;with A
      32  1C6D                .BYTE   ^062
   03ED'  1C6E                .WORD   <PRINT_PASS-HEAD>
          1C70   4962                 ENDIF
          1C70         2153$:                                          ;GENERATE LCL 2153 NAME
          1C70   4963
          1C70   4964                 IF      PRINT_START              ;PRINT START OF TEST IF SET
      3A  1C70                .BYTE   ^072
   03F0'  1C71                .WORD   <PRINT_START-HEAD>
      0F  1C73                .BYTE   ^017
      D2  1C74                .BYTE   ^0322
   1CA5'  1C75                .WORD   <2154$-HEAD>
          1C77   4965
          1C77   4966                 LHLD    NAME_PNT                 ;PRINT TEST NAME
      2A  1C77                .BYTE   ^052
   03BA'  1C78                .WORD   <NAME_PNT-HEAD>
          1C7A   4967                 CALL    PRINT_STRING_R
      CD  1C7A                .BYTE   ^0315
   100E'  1C7B                .WORD   <PRINT_STRING_R-HEAD>
          1C7D   4968
          1C7D   4969                 LXI     H,TEST_START_A           ;PRINT 'TESTING STARTED'
      21  1C7D                .BYTE   <H*8> ! 1
  04'29'  1C7E                .BYTE   <TEST_START_A-HEAD>&255 , <<TEST_START_A-HEAD>&^XFF00>/256
          1C80   4970                 CALL    PRINT_STRING_R
      CD  1C80                .BYTE   ^0315
   100E'  1C81                .WORD   <PRINT_STRING_R-HEAD>
          1C83   4971
          1C83   4972                 LHLD    TIME_PNT                 ;PRINT RUN TIME
      2A  1C83                    .BYTE   ^052
   0448'  1C84                    .WORD   <TIME_PNT-HEAD>
          1C86  4973                      CALL    PRINT_STRING_R
      CD  1C86                    .BYTE   ^0315
   100E'  1C87                    .WORD   <PRINT_STRING_R-HEAD>
          1C89  4974
          1C89  4975                      LXI     H,MINUTES_A                   ;PRINT 'MINUTES' MESSAGE
      21  1C89                    .BYTE   <H*8> ! 1
 03'8C'  1C8A                    .BYTE   <MINUTES_A-HEAD>&255 , <<MINUTES_A-HEAD>&^XFF00>/256
          1C8C  4976                      CALL    PRINT_STRING_R
      CD  1C8C                    .BYTE   ^0315
   100E'  1C8D                    .WORD   <PRINT_STRING_R-HEAD>
          1C8F  4977
          1C8F  4978                      MVI     B,0                           ;POINT TO NEXT RUN TIME
   00 06  1C8F                    .BYTE   <B*8> ! 6 , 0&255
          1C91  4979                      MVI     C,5
   05 0E  1C91                    .BYTE   <C*8> ! 6 , 5&255
          1C93  4980                      LHLD    TIME_PNT
      2A  1C93                    .BYTE   ^052
   0448'  1C94                    .WORD   <TIME_PNT-HEAD>
          1C96  4981                      DAD     B
      09  1C96                    .BYTE   <B*8> ! 9
          1C97  4982                      SHLD    TIME_PNT
      22  1C97                    .BYTE   ^042
   0448'  1C98                    .WORD   <TIME_PNT-HEAD>
          1C9A  4983
          1C9A  4984                      MVI     B,0                           ;POINT TO NEXT TEST NAME
   00 06  1C9A                    .BYTE   <B*8> ! 6 , 0&255
          1C9C  4985                      MVI     C,21
   15 0E  1C9C                    .BYTE   <C*8> ! 6 , 21&255
          1C9E  4986                      LHLD    NAME_PNT
      2A  1C9E                    .BYTE   ^052
   03BA'  1C9F                    .WORD   <NAME_PNT-HEAD>
          1CA1  4987                      DAD     B
      09  1CA1                    .BYTE   <B*8> ! 9
          1CA2  4988                      SHLD    NAME_PNT
      22  1CA2                    .BYTE   ^042
   03BA'  1CA3                    .WORD   <NAME_PNT-HEAD>
          1CA5  4989
          1CA5  4990                      ENDIF
          1CA5        2154$:                                                    ;GENERATE LCL 2154 NAME
          1CA5  4991
          1CA5  4992                      LHLD    INSTR_PNT                     ;POINT TO LENGTH OF INSTRUCTION
      2A  1CA5                    .BYTE   ^052
   0345'  1CA6                    .WORD   <INSTR_PNT-HEAD>
          1CA8  4993                      INX     H
      23  1CA8                    .BYTE   <H*8> ! 3
          1CA9  4994                      MOV     A,M                           ;STORE COUNT IN INSTR_LEN
      7E  1CA9                    .BYTE   ^0100 ! <A*8> ! M
          1CAA  4995                      STA     INSTR_LEN
      32  1CAA                    .BYTE   ^062
   0344'  1CAB                    .WORD   <INSTR_LEN-HEAD>
          1CAD  4996
          1CAD  4997                      MOV     C,A                           ;STORE COUNT IN C
      4F  1CAD                    .BYTE   ^0100 ! <C*8> ! A
          1CAE  4998                      INX     H                             ;HL POINTS TO START OF INSTRUCTION
      23  1CAE                    .BYTE   <H*8> ! 3
```

```
          1CAF  4999                LXI     D,TTBUF                           ;DE POINTS TO TTBUF
     11   1CAF              .BYTE   <D*8> ! 1
08'D1'    1CB0              .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1CB2  5000                CALL    MOVER_R                           ;MOVE INSTRUCTION INTO TTBUF
     CD   1CB2              .BYTE   ^0315
  0F75'   1CB3              .WORD   <MOVER_R-HEAD>
          1CB5  5001
          1CB5  5002                LXI     H,TTBUF                           ;INIT TTY BUFFER POINTER
     21   1CB5              .BYTE   <H*8> ! 1
08'D1'    1CB6              .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1CB8  5003                SHLD    TTBUF_PNT
     22   1CB8              .BYTE   ^042
  044D'   1CB9              .WORD   <TTBUF_PNT-HEAD>
          1CBB  5004
          1CBB  5005                MVI     B,0                               ;POINT TO NEXT INSTRUCTION
  00 06   1CBB              .BYTE   <B*8> ! 6 , 0&255
          1CBD  5006                LDA     INSTR_LEN
     3A   1CBD              .BYTE   ^072
  0344'   1CBE              .WORD   <INSTR_LEN-HEAD>
          1CC0  5007                ADI     2
     C6   1CC0              .BYTE   ^0306
     02   1CC1              .BYTE   2
          1CC2  5008                MOV     C,A
     4F   1CC2              .BYTE   ^0100 ! <C*8> ! A
          1CC3  5009                LHLD    INSTR_PNT
     2A   1CC3              .BYTE   ^052
  0345'   1CC4              .WORD   <INSTR_PNT-HEAD>
          1CC6  5010                DAD     B
     09   1CC6              .BYTE   <B*8> ! 9
          1CC7  5011                SHLD    INSTR_PNT
     22   1CC7              .BYTE   ^042
  0345'   1CC8              .WORD   <INSTR_PNT-HEAD>
          1CCA  5012
          1CCA  5013                ENDIF
          1CCA        2149$:                                                  ;GENERATE LCL 2149 NAME
          1CCA  5014
          1CCA  5015                SET     RESTART
     AF   1CCA              .BYTE   ^0250 ! A                  ;with A
     3C   1CCB              .BYTE   ^04 ! <8*A>
     32   1CCC              .BYTE   ^062
  03F1'   1CCD              .WORD   <RESTART-HEAD>
          1CCF  5016                JMP     PARSER
     C3   1CCF              .BYTE   ^0303
  1DAE'   1CD0              .WORD   <PARSER-HEAD>
          1CD2  5017
```

```
                1CD2  5019 ;*********************************************************************
                1CD2  5020 ;
                1CD2  5021 ;  MAIN LINE ROUTINES
                1CD2  5022 ;
                1CD2  5023 ;*********************************************************************
                1CD2  5024
                1CD2  5025 ;*********************************************************************
                1CD2  5026 ;
                1CD2  5027 ; START_UP
                1CD2  5028 ; THINGS THAT ARE ONLY DONE AT THE BEGINING
                1CD2  5029 ;
                1CD2  5030 ;*********************************************************************
                1CD2  5031
                1CD2  5032 START_UP:          LXI     $SP,PRI_STACK
          31    1CD2               .BYTE     <$SP*8> ! 1
       40 80    1CD3               .BYTE     <PRI_STACK-HEAD>&255 , <<PRI_STACK-HEAD>&^XFF00>/256
                1CD5  5033
                1CD5  5034                   DI                                        ;DISABLE INTERUPTS
          F3    1CD5               .BYTE     ^0363
                1CD6  5035
                1CD6  5036                   CALL    STOP_CPU                          ;STOP CPU IN CASE IT IS RUNNING
          CD    1CD6               .BYTE     ^0315
       10C9'    1CD7               .WORD     <STOP_CPU-HEAD>
                1CD9  5037                   CLEAR   MICRO_STEP                        ;CLEAR MICRO STEP MODE
          AF    1CD9               .BYTE     ^0250 ! A                   ;with A
          32    1CDA               .BYTE     ^062
       038A'    1CDB               .WORD     <MICRO_STEP-HEAD>
                1CDD  5038                   SET     MEM_REQ                           ;ENABLE MEM REQ FOR LATER
          AF    1CDD               .BYTE     ^0250 ! A                   ;with A
          3C    1CDE               .BYTE     ^04 ! <8*A>
          32    1CDF               .BYTE     ^062
       0354'    1CE0               .WORD     <MEM_REQ-HEAD>
                1CE2  5039
                1CE2  5040                   CALL    CHECKSUM
          CD    1CE2               .BYTE     ^0315
       1BE9'    1CE3               .WORD     <CHECKSUM-HEAD>
                1CE5  5041                   LDA     NEWSUM                            ;SAVE CHECKSUM VALUE
          3A    1CE5               .BYTE     ^072
       03BC'    1CE6               .WORD     <NEWSUM-HEAD>
                1CE8  5042                   STA     OLDSUM
          32    1CE8               .BYTE     ^062
       03CF'    1CE9               .WORD     <OLDSUM-HEAD>
                1CEB  5043
                1CEB  5044                   LXI     H,CRD_FLAGS                       ;CLEAR BIT 1 OF CRD_FLAGS TO
          21    1CEB               .BYTE     <H*8> ! 1
       40 FD    1CEC               .BYTE     <CRD_FLAGS-HEAD>&255 , <<CRD_FLAGS-HEAD>&^XFF00>/256
                1CEE  5045                   MVI     A,HEX_FD                          ; INDICATE CRD HAS STARTED
       FD 3E    1CEE               .BYTE     <A*8> ! 6 , HEX_FD&255
                1CF0  5046                   ANA     M
          A6    1CF0               .BYTE     ^0240 ! M
                1CF1  5047                   MOV     M,A
          77    1CF1               .BYTE     ^0100 ! <M*8> ! A
                1CF2  5048
                1CF2  5049                   CLEAR   OFLAG                             ;ENABLE PRINTOUTS
          AF    1CF2               .BYTE     ^0250 ! A                   ;with A
          32    1CF3               .BYTE     ^062
        40BB    1CF4               .WORD     <OFLAG-HEAD>
```

```
              1CF6   5050
              1CF6   5051                 LXI     H,VERSION_1                     ;PRINT VERSION NUMBER
         21   1CF6               .BYTE    <H*8> ! 1
     06'31'   1CF7               .BYTE    <VERSION_1-HEAD>&255 , <<VERSION_1-HEAD>&^XFF00>/256
              1CF9   5052                 CALL    PRINT_STRING_R
         CD   1CF9               .BYTE    ^0315
      100E'   1CFA               .WORD    <PRINT_STRING_R-HEAD>
              1CFC   5053                 LXI     H,VERSION                       ;PRINT VERSION NUMBER
         21   1CFC               .BYTE    <H*8> ! 1
     04'4F'   1CFD               .BYTE    <VERSION-HEAD>&255 , <<VERSION-HEAD>&^XFF00>/256
              1CFF   5054                 CALL    PRINT_STRING_R
         CD   1CFF               .BYTE    ^0315
      100E'   1D00               .WORD    <PRINT_STRING_R-HEAD>
              1D02   5055                 CALL    CRLF_R
         CD   1D02               .BYTE    ^0315
      101A'   1D03               .WORD    <CRLF_R-HEAD>
              1D05   5056
              1D05   5057                 SET     PARITY_ON                       ;INIT PARITY CALC
         AF   1D05               .BYTE    ^0250 ! A                  ;with A
         3C   1D06               .BYTE    ^04 ! <8*A>
         32   1D07               .BYTE    ^062
      0064'   1D08               .WORD    <PARITY_ON-HEAD>
              1D0A   5058                 CLEAR   CONTINUE                        ;INIT CONTINUE FLAG
         AF   1D0A               .BYTE    ^0250 ! A                  ;with A
         32   1D0B               .BYTE    ^062
      003A'   1D0C               .WORD    <CONTINUE-HEAD>
              1D0E   5059                 CLEAR   ERROR                           ;INIT ERROR FLAG
         AF   1D0E               .BYTE    ^0250 ! A                  ;with A
         32   1D0F               .BYTE    ^062
      02E2'   1D10               .WORD    <ERROR-HEAD>
              1D12   5060
              1D12   5061                 CLEAR   EXECUTE
         AF   1D12               .BYTE    ^0250 ! A                  ;with A
         32   1D13               .BYTE    ^062
      02EA'   1D14               .WORD    <EXECUTE-HEAD>
              1D16   5062                 CLEAR   WCS_BAD_PARITY                  ;SET FOR GOOD PARITY
         AF   1D16               .BYTE    ^0250 ! A                  ;with A
         32   1D17               .BYTE    ^062
      006E'   1D18               .WORD    <WCS_BAD_PARITY-HEAD>
              1D1A   5063
              1D1A   5064                 LXI     H,X_CLR_PAGE                    ;CLR WCS HIGH PAGE
         21   1D1A               .BYTE    <H*8> ! 1
     00'7D'   1D1B               .BYTE    <X_CLR_PAGE-HEAD>&255 , <<X_CLR_PAGE-HEAD>&^XFF00>/256
              1D1D   5065                 CALL    PERFORM_CSR_R
         CD   1D1D               .BYTE    ^0315
      12F2'   1D1E               .WORD    <PERFORM_CSR_R-HEAD>
              1D20   5066
              1D20   5067                 ZERO    DATA0,4                         ;RESET OUT OF COMPAT. MODE
         21   1D20               .BYTE    <H*8> ! 1
     00'A9'   1D21               .BYTE    <DATA0-HEAD>&255 , <<DATA0-HEAD>&^XFF00>/256
      04 0E   1D23               .BYTE    <C*8> ! 6 , 4&255
         AF   1D25               .BYTE    ^0250 ! A                  ;with A
              1D26          2155$:        MOV     M,A
         77   1D26               .BYTE    ^0100 ! <M*8> ! A
         23   1D27               .BYTE    <H*8> ! 3
         0D   1D28               .BYTE    ^05 ! <8*C>
         C2   1D29               .BYTE    ^0302
```

```
           1D26' 1D2A                .WORD   <2155$-HEAD>
                 1D2C   5068                 MVI     A,HEX_FF
           FF 3E 1D2C                .BYTE   <A*8> ! 6 , HEX_FF&255
                 1D2E   5069                 CALL    WRITE_LS_R
              CD 1D2E                .BYTE   ^0315
           1146' 1D2F                .WORD   <WRITE_LS_R-HEAD>
                 1D31   5070
                 1D31   5071                 SET     PAR_ON                          ;ENABLE WCS PARITY FOR LATER
              AF 1D31                .BYTE   ^0250 ! A                    ;with A
              3C 1D32                .BYTE   ^04 ! <8*A>
              32 1D33                .BYTE   ^062
           03D6' 1D34                .WORD   <PAR_ON-HEAD>
                 1D36   5072
                 1D36   5073                 RIM                                     ;SET INTERRUPT MASK
              20 1D36                .BYTE   ^040
                 1D37   5074                 ORI     HEX_8
              F6 1D37                .BYTE   ^0366
              08 1D38                .BYTE   HEX_8
                 1D39   5075                 ORI     HEX_1                           ;DISABLE 5.5 INTERRUPT
              F6 1D39                .BYTE   ^0366
              01 1D3A                .BYTE   HEX_1
                 1D3B   5076                 ANI     HEX_0D
              E6 1D3B                .BYTE   ^0346
              0D 1D3C                .BYTE   HEX_0D
                 1D3D   5077                 SIM
              30 1D3D                .BYTE   ^060
                 1D3E   5078
                 1D3E   5079                 EI                                      ;TURN ON INTERRUPTS
              FB 1D3E                .BYTE   ^0373
                 1D3F   5080
                 1D3F   5081                 IF      WARM_RESTART                    ;IF POWER FAIL RESTART
              3A 1D3F                .BYTE   ^072
           04B3' 1D40                .WORD   <WARM_RESTART-HEAD>
              0F 1D42                .BYTE   ^017
              D2 1D43                .BYTE   ^0322
           1D53' 1D44                .WORD   <2156$-HEAD>
                 1D46   5082                 CALL    WRITE_LS_STAT                   ;WRITE CURRENT FLAGS IN LS
              CD 1D46                .BYTE   ^0315
           12DF' 1D47                .WORD   <WRITE_LS_STAT-HEAD>
                 1D49   5083                                                         ; ERROR CONTROL WORD
                 1D49   5084                 LDA     WCS_LOADED                      ;GET WCS LOADED FLAG
              3A 1D49                .BYTE   ^072
           058B' 1D4A                .WORD   <WCS_LOADED-HEAD>
                 1D4C   5085                 ORA     A                               ;SET CONDITION CODES
              B7 1D4C                .BYTE   ^0260 ! A
                 1D4D   5086                 CNZ     EXEC_TEST0                      ;DO WCS INIT IF WCS IS LOADED
              C4 1D4D                .BYTE   ^0304
           1BA1' 1D4E                .WORD   <EXEC_TEST0-HEAD>
                 1D50   5087
                 1D50   5088                 ELSE
              C3 1D50                .BYTE   ^0303
           1D56' 1D51                .WORD   <2157$-HEAD>
                 1D53          2156$:                                                ;GENERATE LOCAL SYMBOL NAME
                 1D53   5089
                 1D53   5090                 CALL    CLEAR_DEFAULT                   ;SET FLAGS TO DEFAULT
              CD 1D53                .BYTE   ^0315
           0B8F' 1D54                .WORD   <CLEAR_DEFAULT-HEAD>
```

```
               1D56  5091                       ENDIF
               1D56        2157$:                                                   ;GENERATE LCL 2157 NAME
               1D56  5092
               1D56  5093                       LXI     H,INSTR_TABLE               ;POINT TO FIRST INSTRUCTION
          21   1D56                 .BYTE       <H*8> ! 1
      06'7A'   1D57                 .BYTE       <INSTR_TABLE-HEAD>&255 , <<INSTR_TABLE-HEAD>&^XFF00>/256
               1D59  5094                       SHLD    INSTR_PNT
          22   1D59                 .BYTE       ^042
       0345'   1D5A                 .WORD       <INSTR_PNT-HEAD>
               1D5C  5095
               1D5C  5096                       LXI     H,NAME_TABLE                ;POINT TO FIRST TEST NAME
          21   1D5C                 .BYTE       <H*8> ! 1
      07'6F'   1D5D                 .BYTE       <NAME_TABLE-HEAD>&255 , <<NAME_TABLE-HEAD>&^XFF00>/256
               1D5F  5097                       SHLD    NAME_PNT
          22   1D5F                 .BYTE       ^042
       03BA'   1D60                 .WORD       <NAME_PNT-HEAD>
               1D62  5098
               1D62  5099                       LXI     H,TIME_TABLE                ;POINT TO FIRST TEST TIME
          21   1D62                 .BYTE       <H*8> ! 1
      08'02'   1D63                 .BYTE       <TIME_TABLE-HEAD>&255 , <<TIME_TABLE-HEAD>&^XFF00>/256
               1D65  5100                       SHLD    TIME_PNT
          22   1D65                 .BYTE       ^042
       0448'   1D66                 .WORD       <TIME_PNT-HEAD>
               1D68  5101
               1D68  5102                       JMP     PARSER                      ;GO
          C3   1D68                 .BYTE       ^0303
       1DAE'   1D69                 .WORD       <PARSER-HEAD>
               1D6B  5103
               1D6B  5104
               1D6B  5105
               1D6B  5106 ;*************************************************************************
               1D6B  5107 ;
               1D6B  5108 ;  PAR
               1D6B  5109 ;  THIS ROUTINE PARSES COMMANDS AND DISPATCHES TO THE ADDRESS GIVEN
               1D6B  5110 ;
               1D6B  5111 ;  INPUT CONDITONS
               1D6B  5112 ;       H+L = PARSE NAME TABLE
               1D6B  5113 ;             EACH ENTRY = LEN,ASCII,JMP ADDRESS
               1D6B  5114 ;             LAST TABLE ENTRY HAS LENTH FF
               1D6B  5115 ;       D+E = BUFFER TO COMPARE ASCII WITH
               1D6B  5116 ;
               1D6B  5117 ;*************************************************************************
               1D6B  5118
               1D6B  5119 PAR_TEMP_BUF:         LXI     D,TEMP_BUF                  ;POINTER TO CHAR BUFFER
          11   1D6B                 .BYTE       <D*8> ! 1
      04'0E'   1D6C                 .BYTE       <TEMP_BUF-HEAD>&255 , <<TEMP_BUF-HEAD>&^XFF00>/256
               1D6E  5120
               1D6E  5121 PAR:                  SHLD    PARSE_TABLE
          22   1D6E                 .BYTE       ^042
       03DC'   1D6F                 .WORD       <PARSE_TABLE-HEAD>
               1D71  5122                       XCHG
          EB   1D71                 .BYTE       ^0353
               1D72  5123                       SHLD    PARSE_PNT                   ;SAVE BUFFER TO COMPARE WITH
          22   1D72                 .BYTE       ^042
       03DA'   1D73                 .WORD       <PARSE_PNT-HEAD>
               1D75  5124                       CLEAR   NOT_FOUND                   ;RESET NOT_FOUND FLAG
          AF   1D75                 .BYTE       ^0250 ! A             ;with A
      32  1D76                  .BYTE    ^062
  03C2'  1D77                  .WORD    <NOT_FOUND-HEAD>
          1D79    5125
          1D79    5126 2$:              LHLD     PARSE_PNT
      2A  1D79                  .BYTE    ^052
  03DA'  1D7A                  .WORD    <PARSE_PNT-HEAD>
          1D7C    5127                  XCHG                           ;ONE POINTER IN D+E
      EB  1D7C                  .BYTE    ^0353
          1D7D    5128                  LHLD     PARSE_TABLE           ;OTHER IN H+L
      2A  1D7D                  .BYTE    ^052
  03DC'  1D7E                  .WORD    <PARSE_TABLE-HEAD>
          1D80    5129                  MOV      C,M                   ;GET COUNTER
      4E  1D80                  .BYTE    ^0100 ! <C*8> ! M
          1D81    5130                  MOV      A,C
      79  1D81                  .BYTE    ^0100 ! <A*8> ! C
          1D82    5131                  CPI      HEX_FF                ;END OF TABLE??
      FE  1D82                  .BYTE    ^0376
      FF  1D83                  .BYTE    HEX_FF
          1D84    5132                  JZ       1$
      CA  1D84                  .BYTE    ^0312
  1DA8'  1D85                  .WORD    <1$-HEAD>
          1D87    5133                  INX      H
      23  1D87                  .BYTE    <H*8> ! 3
          1D88    5134                  CALL     COMPARE_R             ;COMPARE TABLE AND BUFFER
      CD  1D88                  .BYTE    ^0315
  0F55'  1D89                  .WORD    <COMPARE_R-HEAD>
          1D8B    5135
          1D8B    5136                  IFZ
      C2  1D8B                  .BYTE    ^0302
  1D9B'  1D8C                  .WORD    <2158$-HEAD>
          1D8E    5137
          1D8E    5138                  SHLD     PAR_VECT
      22  1D8E                  .BYTE    ^042
  03D7'  1D8F                  .WORD    <PAR_VECT-HEAD>
          1D91    5139                  CALL     SKIP_TO_SPEC          ;SKIP ALL NONPARSED CHARS
      CD  1D91                  .BYTE    ^0315
  0E33'  1D92                  .WORD    <SKIP_TO_SPEC-HEAD>
          1D94    5140                  LHLD     PAR_VECT
      2A  1D94                  .BYTE    ^052
  03D7'  1D95                  .WORD    <PAR_VECT-HEAD>
          1D97    5141
          1D97    5142                  PCHL                           ;BRANCH TO ROUTINES
      E9  1D97                  .BYTE    ^0351
          1D98    5143
          1D98    5144                  ELSE
      C3  1D98                  .BYTE    ^0303
  1DA5'  1D99                  .WORD    <2159$-HEAD>
          1D9B         2158$:                                          ;GENERATE LOCAL SYMBOL NAME
          1D9B    5145
          1D9B    5146                  MOV      A,C                   ;USE LEFTOVER COUNT FROM
      79  1D9B                  .BYTE    ^0100 ! <A*8> ! C
          1D9C    5147                  ADI      4                     ;COMPARE TO SKIP OVER DATA
      C6  1D9C                  .BYTE    ^0306
      04  1D9D                  .BYTE    4
          1D9E    5148                  MOV      C,A
      4F  1D9E                  .BYTE    ^0100 ! <C*8> ! A
          1D9F    5149                  MVI      B,0
```

```
   00 06  1D9F                 .BYTE   <B*8> ! 6 , 0&255
          1DA1   5150                  DAD     B                                     ;SPIP TO NEXT COMMAND
      09  1DA1                 .BYTE   <B*8> ! 9
          1DA2   5151                  SHLD    PARSE_TABLE
      22  1DA2                 .BYTE   ^042
  03DC'   1DA3                 .WORD   <PARSE_TABLE-HEAD>
          1DA5   5152
          1DA5   5153                  ENDIF
          1DA5         2159$:                                                        ;GENERATE LCL 2159 NAME
          1DA5   5154
          1DA5   5155                  JMP     2$
      C3  1DA5                 .BYTE   ^0303
  1D79'   1DA6                 .WORD   <2$-HEAD>
          1DA8   5156
          1DA8   5157 1$:              SET     NOT_FOUND                             ;NOT FOUND
      AF  1DA8                 .BYTE   ^0250 ! A                 ;with A
      3C  1DA9                 .BYTE   ^04 ! <8*A>
      32  1DAA                 .BYTE   ^062
  03C2'   1DAB                 .WORD   <NOT_FOUND-HEAD>
          1DAD   5158                  RET
      C9  1DAD                 .BYTE   ^0311
          1DAE   5159
          1DAE   5160 ;**************************************************************************
          1DAE   5161 ;
          1DAE   5162 ;  PARSER
          1DAE   5163 ;  THIS ROUTINE PARSES THE COMMAND LINE GIVEN AFTER THE PROMPT AND DISPATCHES
          1DAE   5164 ;  TO THE PROPER SUBROUTINE TO HANDLE EACH KEYWORD
          1DAE   5165 ;
          1DAE   5166 ;**************************************************************************
          1DAE   5167
          1DAE   5168 PARSER:           CLEAR   MICRO_STEP
      AF  1DAE                 .BYTE   ^0250 ! A                 ;with A
      32  1DAF                 .BYTE   ^062
  038A'   1DB0                 .WORD   <MICRO_STEP-HEAD>
          1DB2   5169
          1DB2   5170                  WHILENR EXECUTE
      AF  1DB2                 .BYTE   ^0250 ! A                 ;with A
      32  1DB3                 .BYTE   ^062
  02EA'   1DB4                 .WORD   <EXECUTE-HEAD>
          1DB6         4005$:  LDA     EXECUTE
      3A  1DB6                 .BYTE   ^072
  02EA'   1DB7                 .WORD   <EXECUTE-HEAD>
      0F  1DB9                 .BYTE   ^017
      DA  1DBA                 .BYTE   ^0332
  1DF8'   1DBB                 .WORD   <2160$-HEAD>
          1DBD   5171
          1DBD   5172                  IFN     RESTART
      3A  1DBD                 .BYTE   ^072
  03F1'   1DBE                 .WORD   <RESTART-HEAD>
      0F  1DC0                 .BYTE   ^017
      DA  1DC1                 .BYTE   ^0332
  1DCD'   1DC2                 .WORD   <2161$-HEAD>
          1DC4   5173
          1DC4   5174                  CALL    PRINT_PROMPT
      CD  1DC4                 .BYTE   ^0315
  0FD6'   1DC5                 .WORD   <PRINT_PROMPT-HEAD>
          1DC7   5175                  CALL    AUTO_TEST
      CD  1DC7                 .BYTE   ^0315
   1C24'  1DC8                 .WORD   <AUTO_TEST-HEAD>
          1DCA  5176
          1DCA  5177                   ELSE
      C3  1DCA                 .BYTE   ^0303
   1DD4'  1DCB                 .WORD   <2162$-HEAD>
          1DCD         2161$:                                                  ;GENERATE LOCAL SYMBOL NAME
          1DCD  5178
          1DCD  5179                   LXI     $SP,PRI_STACK                   ;SET UP STACK POINTER
      31  1DCD                 .BYTE   <$SP*8> ! 1
   40 80  1DCE                 .BYTE   <PRI_STACK-HEAD>&255 , <<PRI_STACK-HEAD>&^XFF00>/256
          1DD0  5180                   CLEAR   RESTART
      AF  1DD0                 .BYTE   ^0250 ! A                  ;with A
      32  1DD1                 .BYTE   ^062
   03F1'  1DD2                 .WORD   <RESTART-HEAD>
          1DD4  5181
          1DD4  5182                   ENDIF
          1DD4         2162$:                                                  ;GENERATE LCL 2162 NAME
          1DD4  5183
          1DD4  5184
          1DD4  5185                   LXI     H,MAIN_TAB                      ;POINTER TO PARSE TABLE
      21  1DD4                 .BYTE   <H*8> ! 1
  09'31'  1DD5                 .BYTE   <MAIN_TAB-HEAD>&255 , <<MAIN_TAB-HEAD>&^XFF00>/256
          1DD7  5186                   LXI     D,TTBUF                         ;POINTER TO CHAR BUFFER
      11  1DD7                 .BYTE   <D*8> ! 1
  08'D1'  1DD8                 .BYTE   <TTBUF-HEAD>&255 , <<TTBUF-HEAD>&^XFF00>/256
          1DDA  5187                   CALL    PAR
      CD  1DDA                 .BYTE   ^0315
   1D6E'  1DDB                 .WORD   <PAR-HEAD>
          1DDD  5188
          1DDD  5189                   IF      CONT_DONE                       ;CONTINUE PARSED.. BACKUP
      3A  1DDD                 .BYTE   ^072
   0256'  1DDE                 .WORD   <CONT_DONE-HEAD>
      0F  1DE0                 .BYTE   ^017
      D2  1DE1                 .BYTE   ^0322
   1DEE'  1DE2                 .WORD   <2163$-HEAD>
          1DE4  5190                                                           ; INTO STACK ONE LEVEL
          1DE4  5191                   CLEAR   CONT_DONE
      AF  1DE4                 .BYTE   ^0250 ! A                  ;with A
      32  1DE5                 .BYTE   ^062
   0256'  1DE6                 .WORD   <CONT_DONE-HEAD>
          1DE8  5192                   MVI     A,1
   01 3E  1DE8                 .BYTE   <A*8> ! 6 , 1&255
          1DEA  5193                   STA     APT_MESSAGE_CODE+1              ;SET APT START FLAG
      32  1DEA                 .BYTE   ^062
   0011'  1DEB                 .WORD   <APT_MESSAGE_CODE+1-HEAD>
          1DED  5194                   RET
      C9  1DED                 .BYTE   ^0311
          1DEE  5195                   ENDIF
          1DEE         2163$:                                                  ;GENERATE LCL 2163 NAME
          1DEE  5196
          1DEE  5197                   LDA     NOT_FOUND                       ;GET NOT FOUND FLAG
      3A  1DEE                 .BYTE   ^072
   03C2'  1DEF                 .WORD   <NOT_FOUND-HEAD>
          1DF1  5198                   ORA     A                               ;SET CONDITION CODES
      B7  1DF1                 .BYTE   ^0260 ! A
          1DF2  5199                   CNZ     SYNTAX_ERROR                    ;REPORT SYNTAX ERROR IF SET
      C4  1DF2               .BYTE   ^0304
   1BE0'  1DF3               .WORD   <SYNTAX_ERROR-HEAD>
          1DF5  5200
          1DF5  5201                 ENDWHILE
      C3  1DF5               .BYTE   ^0303
   1DB6'  1DF6               .WORD   <4005$-HEAD>
          1DF8          2160$:                                   ;GENERATE LCL 2160 NAME
          1DF8  5202
          1DF8  5203
          1DF8  5204
          1DF8  5205 ;************************************************************************
          1DF8  5206 ;
          1DF8  5207 ;   THIS ROUTINE PARSES THE SECTION TABLE
          1DF8  5208 ;
          1DF8  5209 ;   THERE IS A FLAG WITH EACH SECTION NAME (SECTION_FLAG)
          1DF8  5210 ;
          1DF8  5211 ;   SECTION_FLAG:        FF = END OF TABLE
          1DF8  5212 ;                 BIT 7   0 = NAME IS SECTION NAME FOR WCS
          1DF8  5213 ;                         1 = NAME IS SECTION NAME FOR CONSOLE RAM
          1DF8  5214 ;                 BIT 6   1 = OPTIONAL TEST
          1DF8  5215 ;            BITS 0 - 5  XX = CPU CLUSTER BOARD NUMBER
          1DF8  5216 ;
          1DF8  5217 ;   THERE IS A FLAG STATING HOW THE TABLE IS TO BE PARSED (TABLE_MODE)
          1DF8  5218 ;
          1DF8  5219 ;   TABLE_MODE    0 = TABLE NOT IN USE
          1DF8  5220 ;                 1 = BOARD MODE
          1DF8  5221 ;                 2 = ALL SECTION MODE
          1DF8  5222 ;
          1DF8  5223 ;************************************************************************
          1DF8  5224
          1DF8  5225                 WHILE   EXECUTE
          1DF8          4006$:  LDA  EXECUTE
      3A  1DF8               .BYTE   ^072
   02EA'  1DF9               .WORD   <EXECUTE-HEAD>
      0F  1DFB               .BYTE   ^017
      D2  1DFC               .BYTE   ^0322
   1EB7'  1DFD               .WORD   <2164$-HEAD>
          1DFF  5226
          1DFF  5227                 IFNEQI  TABLE_MODE,0
      3A  1DFF               .BYTE   ^072
   040B'  1E00               .WORD   <TABLE_MODE-HEAD>
      FE  1E02               .BYTE   ^0376
      00  1E03               .BYTE   0
      CA  1E04               .BYTE   ^0312
   1E63'  1E05               .WORD   <2165$-HEAD>
          1E07  5228
          1E07  5229                 CALL    SET_ALL_TESTS           ;SET UP TEST NUM FOR ALL
      CD  1E07               .BYTE   ^0315
   1EBA'  1E08               .WORD   <SET_ALL_TESTS-HEAD>
          1E0A  5230                                                 ; TESTS AND CLEAR EOS FLG
          1E0A  5231                 UNTILR  FILE_LOADED
      AF  1E0A               .BYTE   ^0250 ! A           ;with A
      32  1E0B               .BYTE   ^062
   02FD'  1E0C               .WORD   <FILE_LOADED-HEAD>
          1E0E          4007$:  LDA  FILE_LOADED
      3A  1E0E               .BYTE   ^072
   02FD'  1E0F               .WORD   <FILE_LOADED-HEAD>
```

```
     0F  1E11                  .BYTE   ^017
     DA  1E12                  .BYTE   ^0332
  1E60'  1E13                  .WORD   <2166$-HEAD>
         1E15   5232
         1E15   5233                   LHLD    TABLE_PNT                     ;POINTER TO SECTION TABLE
     2A  1E15                  .BYTE   ^052
  040C'  1E16                  .WORD   <TABLE_PNT-HEAD>
         1E18   5234                   LXI     D,TEMP_FLAG                   ;POINTER TO TEMP DATA BUFFER
     11  1E18                  .BYTE   <D*8> ! 1
 04'1F'  1E19                  .BYTE   <TEMP_FLAG-HEAD>&255 , <<TEMP_FLAG-HEAD>&^XFF00>/256
         1E1B   5235                   MVI     C,SEC_LEN+1                   ;COUNT
  07 0E  1E1B                  .BYTE   <C*8> ! 6 , SEC_LEN+1&255
         1E1D   5236                   CALL    MOVER_R                       ;MOVE ENTRIES TO LOCAL BUFFER
     CD  1E1D                  .BYTE   ^0315
  0F75'  1E1E                  .WORD   <MOVER_R-HEAD>
         1E20   5237                   SHLD    TABLE_PNT                     ;UPDATE SECTION TABLE POINTER
     22  1E20                  .BYTE   ^042
  040C'  1E21                  .WORD   <TABLE_PNT-HEAD>
         1E23   5238
         1E23   5239                   LDA     TEMP_FLAG
     3A  1E23                  .BYTE   ^072
  041F'  1E24                  .WORD   <TEMP_FLAG-HEAD>
         1E26   5240                   ANI     HEX_3F
     E6  1E26                  .BYTE   ^0346
     3F  1E27                  .BYTE   HEX_3F
         1E28   5241                   STA     SECTION_B_NUM                 ;SAVE BOARD THAT OWNS THIS SEC
     32  1E28                  .BYTE   ^062
  0404'  1E29                  .WORD   <SECTION_B_NUM-HEAD>
         1E2B   5242
         1E2B   5243                   IFEQI   TEMP_FLAG,HEX_FF              ;END OF TABLE??
     3A  1E2B                  .BYTE   ^072
  041F'  1E2C                  .WORD   <TEMP_FLAG-HEAD>
     FE  1E2E                  .BYTE   ^0376
     FF  1E2F                  .BYTE   HEX_FF
     C2  1E30                  .BYTE   ^0302
  1E39'  1E31                  .WORD   <2167$-HEAD>
         1E33   5244
         1E33   5245                   CALL    EOP
     CD  1E33                  .BYTE   ^0315
  183E'  1E34                  .WORD   <EOP-HEAD>
         1E36   5246
         1E36   5247                   ELSE
     C3  1E36                  .BYTE   ^0303
  1E5D'  1E37                  .WORD   <2168$-HEAD>
         1E39        2167$:                                              ;GENERATE LOCAL SYMBOL NAME
         1E39   5248
         1E39   5249
         1E39   5250                   IFNMBI  TEMP_FLAG,OPTIONAL_TST  ;OPTIONAL TEST??
     3A  1E39                  .BYTE   ^072
  041F'  1E3A                  .WORD   <TEMP_FLAG-HEAD>
     E6  1E3C                  .BYTE   ^0346
     40  1E3D                  .BYTE   OPTIONAL_TST
     C2  1E3E                  .BYTE   ^0302
  1E5D'  1E3F                  .WORD   <2169$-HEAD>
         1E41   5251
         1E41   5252                   IFEQI   TABLE_MODE,1                  ;BOARD MODE??
     3A  1E41                  .BYTE   ^072
```

```
ZZ-
.MA
Sym

$PS
$SP
A
ABO
ACK
ADD
ALL
APT
APT
APT
APT
APT
APT
APT
APT
APT
APT
APT
APT
APT
APT
ASC
ASC
ASC
ASC
ATT
ATT
AUT
AUT
A_A
B
BAD
BAD
BAD
BEC
BEC
BEC
BEL
BEL
BOA
BOA
BOA
BOA
BOA
BOO
BOO
BY
B_
C
CA
CC
CHA
CH
CH
CH
CH
```

```
  040B'  1E42                  .WORD   <TABLE_MODE-HEAD>
     FE  1E44                  .BYTE   ^0376
     01  1E45                  .BYTE   1
     C2  1E46                  .BYTE   ^0302
  1E5A'  1E47                  .WORD   <2170$-HEAD>
         1E49  5253
         1E49  5254                    IFMB    BOARD_NUM,SECTION_B_NUM ;SEC BELONG TO THIS BOARD?
     3A  1E49                  .BYTE   ^072
  0404'  1E4A                  .WORD   <SECTION_B_NUM-HEAD>
     47  1E4C                  .BYTE   ^0100 ! <B*8> ! A
     3A  1E4D                  .BYTE   ^072
  024D'  1E4E                  .WORD   <BOARD_NUM-HEAD>
     A0  1E50                  .BYTE   ^0240 ! B
     CA  1E51                  .BYTE   ^0312
  1E57'  1E52                  .WORD   <2171$-HEAD>
         1E54  5255                    CALL    MOV_LOAD_SECTION        ;MOVE NAME TO SECTION_NAME AND
     CD  1E54                  .BYTE   ^0315
  1A80'  1E55                  .WORD   <MOV_LOAD_SECTION-HEAD>
         1E57  5256                                                    ; LOAD SECTION
         1E57  5257                    ENDIF
         1E57        2171$:                                            ;GENERATE LCL 2171 NAME
         1E57  5258
         1E57  5259                    ELSE
     C3  1E57                  .BYTE   ^0303
  1E5D'  1E58                  .WORD   <2172$-HEAD>
         1E5A        2170$:                                            ;GENERATE LOCAL SYMBOL NAME
         1E5A  5260                    CALL    MOV_LOAD_SECTION        ;IF DI MODE, MOVE NAME TO
     CD  1E5A                  .BYTE   ^0315
  1A80'  1E5B                  .WORD   <MOV_LOAD_SECTION-HEAD>
         1E5D  5261                                                    ; SECTION_NAME AND LOAD SECTION
         1E5D  5262                    ENDIF
         1E5D        2172$:                                            ;GENERATE LCL 2172 NAME
         1E5D  5263
         1E5D  5264                    ENDIF
         1E5D        2169$:                                            ;GENERATE LCL 2169 NAME
         1E5D  5265
         1E5D  5266                    ENDIF
         1E5D        2168$:                                            ;GENERATE LCL 2168 NAME
         1E5D  5267
         1E5D  5268                    ENDUNTIL
     C3  1E5D                  .BYTE   ^0303
  1E0E'  1E5E                  .WORD   <4007$-HEAD>
         1E60        2166$:                                            ;GENERATE LCL 2166 NAME
         1E60  5269
         1E60  5270                    ELSE
     C3  1E60                  .BYTE   ^0303
  1E6A'  1E61                  .WORD   <2173$-HEAD>
         1E63        2165$:                                            ;GENERATE LOCAL SYMBOL NAME
         1E63  5271
         1E63  5272                    LDA     EOS_FLG                 ;GET EOS FLAG
     3A  1E63                  .BYTE   ^072
  0056'  1E64                  .WORD   <EOS_FLG-HEAD>
         1E66  5273                    ORA     A                       ;SET CONDITION CODES
     B7  1E66                  .BYTE   ^0260 ! A
         1E67  5274                    CNZ     EOP                     ;CALL EOP IF SET
     C4  1E67                  .BYTE   ^0304
  183E'  1E68                  .WORD   <EOP-HEAD>
```

```
ZZ-
.MA
Sym

CON
CON
CON
CON
CON
CON
CON
CON
CPA
CPU
CPU
CR
CRD
CRD
CRL
CRL
CRL
CSR
CSR
CSR
CSR
CSR
CSR
CTL
C_
C_
D
DA
DA
DA
DA
DA
DA
DA
DCL
DE
DE
DI
DI
DI
DI
DI
DI
DI
DI
DI
DI
DO
DO
DO
E
EM
EN
EN
EN
EN
EN
```

```
        1E6A  5275
        1E6A  5276                    ENDIF                                  ;GENERATE LCL 2173 NAME
        1E6A       2173$:
        1E6A  5277
        1E6A  5278                    IF       EXECUTE
     3A 1E6A                  .BYTE   ^072
  02EA' 1E6B                  .WORD   <EXECUTE-HEAD>
     0F 1E6D                  .BYTE   ^017
     D2 1E6E                  .BYTE   ^0322
  1EB4' 1E6F                  .WORD   <2174$-HEAD>
        1E71  5279
        1E71  5280                    LDA      APT_PASS_CNT+1                ;GET PASS CNT
     3A 1E71                  .BYTE   ^072
  0019' 1E72                  .WORD   <APT_PASS_CNT+1-HEAD>
        1E74  5281                    ORA      A                             ;SET CONDITION CODES
     B7 1E74                  .BYTE   ^0260 ! A
        1E75  5282                    JNZ      1$                            ;JUMP OUT IF LSB NOT 0
     C2 1E75                  .BYTE   ^0302
  1E7C' 1E76                  .WORD   <1$-HEAD>
        1E78  5283                    LDA      APT_PASS_CNT                  ;GET MSB OF PASS CNT
     3A 1E78                  .BYTE   ^072
  0018' 1E79                  .WORD   <APT_PASS_CNT-HEAD>
        1E7B  5284                    ORA      A                             ;SET CONDITION CODES
     B7 1E7B                  .BYTE   ^0260 ! A
        1E7C  5285
        1E7C  5286 1$:                IF       CONSOLE_TEST
     3A 1E7C                  .BYTE   ^072
  0255' 1E7D                  .WORD   <CONSOLE_TEST-HEAD>
     0F 1E7F                  .BYTE   ^017
     D2 1E80                  .BYTE   ^0322
  1E9E' 1E81                  .WORD   <2175$-HEAD>
        1E83  5287                    CLEAR    FAST_WRITE
     AF 1E83                  .BYTE   ^0250 ! A                     ;with A
     32 1E84                  .BYTE   ^062
  02FC' 1E85                  .WORD   <FAST_WRITE-HEAD>
        1E87  5288                    ZERO     DATA0,4                       ;RESET OUT OF COMPAT. MODE
     21 1E87                  .BYTE   <H*8> ! 1
 00'A9' 1E88                  .BYTE   <DATA0-HEAD>&255 , <<DATA0-HEAD>&^XFF00>/256
  04 0E 1E8A                  .BYTE   <C*8> ! 6 , 4&255
     AF 1E8C                  .BYTE   ^0250 ! A                     ;with A
        1E8D       2176$:             MOV      M,A
     77 1E8D                  .BYTE   ^0100 ! <M*8> ! A
     23 1E8E                  .BYTE   <H*8> ! 3
     0D 1E8F                  .BYTE   ^05 ! <8*C>
     C2 1E90                  .BYTE   ^0302
  1E8D' 1E91                  .WORD   <2176$-HEAD>
        1E93  5289                    MVI      A,HEX_FF
  FF 3E 1E93                  .BYTE   <A*8> ! 6 , HEX_FF&255
        1E95  5290                    CALL     WRITE_LS_R
     CD 1E95                  .BYTE   ^0315
  1146' 1E96                  .WORD   <WRITE_LS_R-HEAD>
        1E98  5291                    CALL     EXEC_CONTESTS
     CD 1E98                  .BYTE   ^0315
   7000 1E99                  .WORD   <EXEC_CONTESTS-HEAD>
        1E9B  5292
        1E9B  5293                    ELSE
     C3 1E9B                  .BYTE   ^0303
```

```
1EB4' 1E9C              .WORD   <2177$-HEAD>
      1E9E        2175$:                                                ;GENERATE LOCAL SYMBOL NAME
      1E9E  5294
      1E9E  5295                LDA     TEST_NUM1                       ;USE TEST NUMBER AS STARTING
   3A 1E9E              .BYTE   ^072
0427' 1E9F              .WORD   <TEST_NUM1-HEAD>
      1EA1  5296                MOV     H,A                             ;ADDRESS IN WCS
   67 1EA1              .BYTE   ^0100 ! <H*8> ! A
      1EA2  5297                XRA     A
   AF 1EA2              .BYTE   ^0250 ! A                 ;with A
      1EA3  5298                MOV     L,A
   6F 1EA3              .BYTE   ^0100 ! <L*8> ! A
      1EA4  5299                SHLD    STARTING_UPC
   22 1EA4              .BYTE   ^042
0407' 1EA5              .WORD   <STARTING_UPC-HEAD>
      1EA7  5300
      1EA7  5301                LDA     TEST_NUM1                       ;SET UP FOR INC ON BEG OF TEST
   3A 1EA7              .BYTE   ^072
0427' 1EA8              .WORD   <TEST_NUM1-HEAD>
      1EAA  5302                DCR     A
   3D 1EAA              .BYTE   ^05 ! <8*A>
      1EAB  5303                STA     TEST_NUM
   32 1EAB              .BYTE   ^062
0426' 1EAC              .WORD   <TEST_NUM-HEAD>
      1EAE  5304
      1EAE  5305                CALL    START_CPU
   CD 1EAE              .BYTE   ^0315
10FF' 1EAF              .WORD   <START_CPU-HEAD>
      1EB1  5306                CALL    ATTENTION
   CD 1EB1              .BYTE   ^0315
1321' 1EB2              .WORD   <ATTENTION-HEAD>
      1EB4  5307
      1EB4  5308                ENDIF
      1EB4        2177$:                                                ;GENERATE LCL 2177 NAME
      1EB4  5309
      1EB4  5310                ENDIF
      1EB4        2174$:                                                ;GENERATE LCL 2174 NAME
      1EB4  5311
      1EB4  5312                ENDWHILE
   C3 1EB4              .BYTE   ^0303
1DF8' 1EB5              .WORD   <4006$-HEAD>
      1EB7        2164$:                                                ;GENERATE LCL 2164 NAME
      1EB7  5313
      1EB7  5314                JMP     PARSER
   C3 1EB7              .BYTE   ^0303
1DAE' 1EB8              .WORD   <PARSER-HEAD>
      1EBA  5315
      1EBA  5316 ;****************************************************************************
      1EBA  5317 ;
      1EBA  5318 ;  SET_ALL_TESTS
      1EBA  5319 ;
      1EBA  5320 ;  THIS ROUTINE SETS STARTING TEST NUM TO 1, ENDING TEST NUM TO 50(H) AND
      1EBA  5321 ;  CLEARS THE EOS FLAG.
      1EBA  5322 ;
      1EBA  5323 ;****************************************************************************
      1EBA  5324
      1EBA  5325 SET_ALL_TESTS:
```

```
               1EBA  5326                      MVI     A,1
        01 3E  1EBA              .BYTE         <A*8> ! 6 , 1&255
               1EBC  5327                      STA     TEST_NUM1                    ;SET TO START AT TEST 1(D)
           32  1EBC              .BYTE         ^062
        0427'  1EBD              .WORD         <TEST_NUM1-HEAD>
               1EBF  5328
               1EBF  5329                      MVI     A,HEX_50
        50 3E  1EBF              .BYTE         <A*8> ! 6 , HEX_50&255
               1EC1  5330                      STA     TEST_NUM2                    ;SET UP ENDING TEST
           32  1EC1              .BYTE         ^062
        0428'  1EC2              .WORD         <TEST_NUM2-HEAD>
               1EC4  5331
               1EC4  5332                      CLEAR   EOS_FLG
           AF  1EC4              .BYTE         ^0250 ! A                  ;with A
           32  1EC5              .BYTE         ^062
        0056'  1EC6              .WORD         <EOS_FLG-HEAD>
               1EC8  5333
               1EC8  5334                      RET                                  ;DONE
           C9  1EC8              .BYTE         ^0311
               1EC9  5335
               1EC9  5336 ;
               1EC9  5337 ;CONSOLE TEST SUBROUTINES
               1EC9  5338 ;
               1EC9  5339
               1EC9  5340 ;*******************************************************************************
               1EC9  5341 ;
               1EC9  5342 ;  CON_BEGIN_TEST_R  THIS ROUTINE IS USED FOR BEGINNING OF TEST FOR CONSOLE
               1EC9  5343 ;                     BASED CPU TESTS ONLY.
               1EC9  5344 ;
               1EC9  5345 ;                     INPUT CONDITIONS:
               1EC9  5346 ;                          A=TEST NUMBER
               1EC9  5347 ;
               1EC9  5348 ;*******************************************************************************
               1EC9  5349
               1EC9  5350 CON_BEGIN_TEST_R:
               1EC9  5351                      STA     TEST_NUM                     ;SAVE TEST NUMBER
           32  1EC9              .BYTE         ^062
        0426'  1ECA              .WORD         <TEST_NUM-HEAD>
               1ECC  5352                      SET     CONTINUE                     ;SET UP TO CONTINUE IF TEST
           AF  1ECC              .BYTE         ^0250 ! A                  ;with A
           3C  1ECD              .BYTE         ^04 ! <8*A>
           32  1ECE              .BYTE         ^062
        003A'  1ECF              .WORD         <CONTINUE-HEAD>
               1ED1  5353                                                           ; STOPPED BY OTHER THAN ^P
               1ED1  5354                      CALL    GCVECT                       ;CHECK FOR OPERATOR REQUEST
           CD  1ED1              .BYTE         ^0315
         4129  1ED2              .WORD         <GCVECT-HEAD>
               1ED4  5355
               1ED4  5356                      CALL    CHECK_CNTLC                  ;IF ^C, GO BACK TO PARSER AND
           CD  1ED4              .BYTE         ^0315
        1073'  1ED5              .WORD         <CHECK_CNTLC-HEAD>
               1ED7  5357                                                           ; ALLOW CONTINUE
               1ED7  5358
               1ED7  5359                      MVI     A,1
        01 3E  1ED7              .BYTE         <A*8> ! 6 , 1&255
               1ED9  5360                      STA     APT_MESSAGE_CODE+1           ;SET APT START FLAG
           32  1ED9              .BYTE         ^062
```

```
  0011' 1EDA                 .WORD   <APT_MESSAGE_CODE+1-HEAD>
        1EDC  5361
        1EDC  5362                   IFGT    TEST_NUM1,TEST_NUM,1
     21 1EDC                 .BYTE   <H*8> ! 1
04'27'  1EDD                 .BYTE   <TEST_NUM1-HEAD>&255 , <<TEST_NUM1-HEAD>&^XFF00>/256
     11 1EDF                 .BYTE   <D*8> ! 1
04'26'  1EE0                 .BYTE   <TEST_NUM-HEAD>&255 , <<TEST_NUM-HEAD>&^XFF00>/256
  01 0E 1EE2                 .BYTE   <C*8> ! 6 , 1&255
     CD 1EE4                 .BYTE   ^0315
  00CF' 1EE5                 .WORD   <COMPARE-HEAD>
     F2 1EE7                 .BYTE   ^0362
  1EF2' 1EE8                 .WORD   <2178$-HEAD>
        1EEA  5363                   SET     SKIP_TEST
     AF 1EEA                 .BYTE   ^0250 ! A                  ;with A
     3C 1EEB                 .BYTE   ^04 ! <8*A>
     32 1EEC                 .BYTE   ^062
  006A' 1EED                 .WORD   <SKIP_TEST-HEAD>
        1EEF  5364
        1EEF  5365                   ELSE
     C3 1EEF                 .BYTE   ^0303
  1F13' 1EF0                 .WORD   <2179$-HEAD>
        1EF2        2178$:                                                  ;GENERATE LOCAL SYMBOL NAME
        1EF2  5366
        1EF2  5367                   CLEAR   SKIP_TEST
     AF 1EF2                 .BYTE   ^0250 ! A                  ;with A
     32 1EF3                 .BYTE   ^062
  006A' 1EF4                 .WORD   <SKIP_TEST-HEAD>
        1EF6  5368
        1EF6  5369                   IFGT    TEST_NUM,TEST_NUM2,1
     21 1EF6                 .BYTE   <H*8> ! 1
04'26'  1EF7                 .BYTE   <TEST_NUM-HEAD>&255 , <<TEST_NUM-HEAD>&^XFF00>/256
     11 1EF9                 .BYTE   <D*8> ! 1
04'28'  1EFA                 .BYTE   <TEST_NUM2-HEAD>&255 , <<TEST_NUM2-HEAD>&^XFF00>/256
  01 0E 1EFC                 .BYTE   <C*8> ! 6 , 1&255
     CD 1EFE                 .BYTE   ^0315
  00CF' 1EFF                 .WORD   <COMPARE-HEAD>
     F2 1F01                 .BYTE   ^0362
  1F0D' 1F02                 .WORD   <2180$-HEAD>
        1F04  5370                   SET     EOS_FLG                        ;FORCE END OF SECTION
     AF 1F04                 .BYTE   ^0250 ! A                  ;with A
     3C 1F05                 .BYTE   ^04 ! <8*A>
     32 1F06                 .BYTE   ^062
  0056' 1F07                 .WORD   <EOS_FLG-HEAD>
        1F09  5371                   RET
     C9 1F09                 .BYTE   ^0311
        1F0A  5372
        1F0A  5373                   ELSE
     C3 1F0A                 .BYTE   ^0303
  1F13' 1F0B                 .WORD   <2181$-HEAD>
        1F0D        2180$:                                                  ;GENERATE LOCAL SYMBOL NAME
        1F0D  5374                   LDA     TEST_NUM                       ;GET TEST NUMBER
     3A 1F0D                 .BYTE   ^072
  0426' 1F0E                 .WORD   <TEST_NUM-HEAD>
        1F10  5375                   STA     APT_TEST_NUMBER+1              ;SAVE IN APT MAILBOX
     32 1F10                 .BYTE   ^062
  0017' 1F11                 .WORD   <APT_TEST_NUMBER+1-HEAD>
        1F13  5376                   ENDIF
```

```
               1F13       2181$:                                                  ;GENERATE LCL 2181 NAME
               1F13  5377
               1F13  5378                         ENDIF
               1F13       2179$:                                                  ;GENERATE LCL 2179 NAME
               1F13  5379
               1F13  5380                         RET
          C9   1F13                       .BYTE   ^0311
               1F14  5381
               1F14  5382
               1F14  5383
               1F14  5384 ;*************************************************************************
               1F14  5385 ;
               1F14  5386 ;   CON_ERROR_R  THIS ROUTINE IS EXECUTED TO PRINT AN ERROR FOUND BY A
               1F14  5387 ;                  CONSOLE BASED CPU TEST.
               1F14  5388 ;
               1F14  5389 ;*************************************************************************
               1F14  5390
               1F14  5391
               1F14  5392 CON_ERROR_R:            OUT     CLRLIT                  ;TURN RUN LITE OFF
                                          .BYTE   ^0323 , CLRLIT&255      ;register A
       3C D3   1F14                               CALL    MSK_ERROR_R             ;MASK THE EXPECTED AND RECEIVED
               1F16  5393
          CD   1F16                       .BYTE   ^0315
     1F31'     1F17                       .WORD   <MSK_ERROR_R-HEAD>
               1F19  5394                                                         ; DATA TO ELIMINATE ANY BITS
               1F19  5395                                                         ; WHICH ARE NOT OF INTEREST.
               1F19  5396                         CALL    WCS_ERROR               ;CALL MICMON ROUTINE TO PRINT ERROR
          CD   1F19                       .BYTE   ^0315
     1442'     1F1A                       .WORD   <WCS_ERROR-HEAD>
               1F1C  5397                                                         ; REPORT
               1F1C  5398                         LDA     FLAGS                   ;DO NOT SET ERROR CON FLAG IF LOOP
          3A   1F1C                       .BYTE   ^072
     005A'     1F1D                       .WORD   <FLAGS-HEAD>
               1F1F  5399                         RAR                             ; ON ERROR IS NOT SET
          1F   1F1F                       .BYTE   ^037
               1F20  5400                         JNC     1$
          D2   1F20                       .BYTE   ^0322
     1F2E'     1F21                       .WORD   <1$-HEAD>
               1F23  5401
               1F23  5402                         SET     ERROR_CON               ;SET FLAG SAYING ERROR HAPPENED AND
          AF   1F23                       .BYTE   ^0250 ! A                       ;with A
          3C   1F24                       .BYTE   ^04 ! <8*A>
          32   1F25                       .BYTE   ^062
     0057'     1F26                       .WORD   <ERROR_CON-HEAD>
               1F28  5403                                                         ; LOOP ON ERROR WAS SET
               1F28  5404                         CALL    GCVECT                  ;CHECK FOR OPERATOR INPUT
          CD   1F28                       .BYTE   ^0315
      4129     1F29                       .WORD   <GCVECT-HEAD>
               1F2B  5405                         CALL    CHECK_CNTLC             ;CHECK FOR CONTROL C INPUT
          CD   1F2B                       .BYTE   ^0315
     1073'     1F2C                       .WORD   <CHECK_CNTLC-HEAD>
               1F2E  5406 1$:                     OUT     SETLIT                  ;TURN RUN LITE BACK ON
       3D D3   1F2E                       .BYTE   ^0323 , SETLIT&255      ;register A
               1F30  5407                         RET
          C9   1F30                       .BYTE   ^0311
               1F31  5408
               1F31  5409
               1F31  5410 ;*************************************************************************
```

```
        1F31  5411 ;
        1F31  5412 ;  MSK_ERROR_R  THIS ROUTINE MASKS DATA FROM BOTH THE CON_EXP_DAT AND
        1F31  5413 ;               CON_REC_DAT AREAS BY USING THE ERROR MASK DATA. A ONE
        1F31  5414 ;               IN THE ERROR MASK INDICATES THAT THAT PARTICULAR BIT IS
        1F31  5415 ;               NOT OF INTEREST AND SHOULD BE SET TO ZERO.
        1F31  5416 ;
        1F31  5417 ;*********************************************************************
        1F31  5418
        1F31  5419 MSK_ERROR_R:    LXI     H,CON_EXP_DAT   ;MOVE MEMORY ADDRESS CON_EXP_DAT
     21 1F31                .BYTE   <H*8> ! 1
 00'40' 1F32                .BYTE   <CON_EXP_DAT-HEAD>&255 , <<CON_EXP_DAT-HEAD>&^XFF00>/256
                                                        ; INTO THE H,L PAIR.
        1F34  5420
        1F34  5421                      SHLD    CON_EXP_ADD     ;STORE THE ADDRESS OF THE EXPECTED
     22 1F34                .BYTE   ^042
  0044' 1F35                .WORD   <CON_EXP_ADD-HEAD>
                                                        ; DATA IN CON_EXP_DAT.
        1F37  5422
        1F37  5423                      LXI     D,CON_MSK_DAT   ;MOVE MEMORY ADDRESS CON_MSK_DAT
     11 1F37                .BYTE   <D*8> ! 1
 00'4B' 1F38                .BYTE   <CON_MSK_DAT-HEAD>&255 , <<CON_MSK_DAT-HEAD>&^XFF00>/256
                                                        ; INTO THE D,E PAIR.
        1F3A  5424
        1F3A  5425
        1F3A  5426                      DO      4               ;LOOP 4 TIMES TO MASK 4 BYTES OF
     21 1F3A                .BYTE   <H*8> ! 1
 00'55' 1F3B                .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     46 1F3D                .BYTE   ^0100 ! <B*8> ! M
     C5 1F3E                .BYTE   ^0305 ! <8*B>
  04 3E 1F3F                .BYTE   <A*8> ! 6 , 4&255
     77 1F41                .BYTE   ^0100 ! <M*8> ! A
        1F42        2182$:
                                                        ; EXPECTED DATA.
        1F42  5427
        1F42  5428                      LHLD    CON_EXP_ADD     ;MOVE THE MEMORY ADDRESS OF THE BYTE
     2A 1F42                .BYTE   ^052
  0044' 1F43                .WORD   <CON_EXP_ADD-HEAD>
                                                        ; OF EXPECTED DATA INTO THE H,L PAIR.
        1F45  5429
        1F45  5430                      CALL    MSK_BYTE        ;CALL ROUTINE TO MASK 1 BYTE
     CD 1F45                .BYTE   ^0315
  1F78' 1F46                .WORD   <MSK_BYTE-HEAD>
        1F48  5431                      SHLD    CON_EXP_ADD     ;STORE THE MEMORY ADDRESS OF THE
     22 1F48                .BYTE   ^042
  0044' 1F49                .WORD   <CON_EXP_ADD-HEAD>
                                                        ; EXPECTED DATA INTO CON_EXP_ADD.
        1F4B  5432
        1F4B  5433                      ENDDO
     21 1F4B                .BYTE   <H*8> ! 1
 00'55' 1F4C                .BYTE   <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
     35 1F4E                .BYTE   ^05 ! <8*M>
     C2 1F4F                .BYTE   ^0302
  1F42' 1F50                .WORD   <2182$-HEAD>
     C1 1F52                .BYTE   ^0301 ! <8*B>
     70 1F53                .BYTE   ^0100 ! <M*8> ! B
        1F54  5434
        1F54  5435                      LXI     H,CON_REC_DAT   ;MOVE MEMORY ADDRESS CON_REC_DAT
     21 1F54                .BYTE   <H*8> ! 1
 00'4F' 1F55                .BYTE   <CON_REC_DAT-HEAD>&255 , <<CON_REC_DAT-HEAD>&^XFF00>/256
                                                        ; INTO THE H,L PAIR.
        1F57  5436
        1F57  5437                      SHLD    CON_REC_ADD     ;STORE THE ADDRESS OF THE RECEIVED
     22 1F57                .BYTE   ^042
  0053' 1F58                .WORD   <CON_REC_ADD-HEAD>
```

```
          1F5A  5438                                            ; DATA IN CON_REC_ADD.
          1F5A  5439                    LXI     D,CON_MSK_DAT   ;MOV MEMORY ADDRESS CON_MSK_DAT
      11  1F5A               .BYTE      <D*8> ! 1
  00'4B'  1F5B               .BYTE      <CON_MSK_DAT-HEAD>&255 , <<CON_MSK_DAT-HEAD>&^XFF00>/256
          1F5D  5440                                            ; INTO THE D,E PAIR.
          1F5D  5441
          1F5D  5442                    DO      4               ;LOOP 4 TIMES TO MASK 4 BYTES OF
      21  1F5D               .BYTE      <H*8> ! 1
  00'55'  1F5E               .BYTE      <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
      46  1F60               .BYTE      ^0100 ! <B*8> ! M
      C5  1F61               .BYTE      ^0305 ! <8*B>
   04 3E  1F62               .BYTE      <A*8> ! 6 , 4&255
      77  1F64               .BYTE      ^0100 ! <M*8> ! A
          1F65        2183$:
          1F65  5443                                            ; RECEIVED DATA.
          1F65  5444                    LHLD    CON_REC_ADD     ;LOAD THE ADDRESS OF THE RECEIVED
      2A  1F65               .BYTE      ^052
   0053'  1F66               .WORD      <CON_REC_ADD-HEAD>
          1F68  5445                                            ; DATA INTO THE H,L PAIR.
          1F68  5446                    CALL    MSK_BYTE        ;CALL ROUTINE TO MASK ONE BYTE
      CD  1F68               .BYTE      ^0315
   1F78'  1F69               .WORD      <MSK_BYTE-HEAD>
          1F6B  5447                    SHLD    CON_REC_ADD     ;STORE THE ADDRESS OF THE RECEIVED.
      22  1F6B               .BYTE      ^042
   0053'  1F6C               .WORD      <CON_REC_ADD-HEAD>
          1F6E  5448                                            ; DATA IN CON_REC_ADD.
          1F6E  5449                    ENDDO
      21  1F6E               .BYTE      <H*8> ! 1
  00'55'  1F6F               .BYTE      <DOLOOP-HEAD>&255 , <<DOLOOP-HEAD>&^XFF00>/256
      35  1F71               .BYTE      ^05 ! <8*M>
      C2  1F72               .BYTE      ^0302
   1F65'  1F73               .WORD      <2183$-HEAD>
      C1  1F75               .BYTE      ^0301 ! <8*B>
      70  1F76               .BYTE      ^0100 ! <M*8> ! B
          1F77  5450
          1F77  5451                    RET
      C9  1F77               .BYTE      ^0311
          1F78  5452
          1F78  5453 MSK_BYTE:          MOV     B,M             ;MOVE A BYTE OF EXPECTED DATA INTO
      46  1F78               .BYTE      ^0100 ! <B*8> ! M
          1F79  5454                                            ; REGISTER B.
          1F79  5455                    LDAX    D               ;MOVE A BYTE OF MASK DATA INTO
      1A  1F79               .BYTE      <D*8> ! 10
          1F7A  5456                                            ; THE ACCUMULATOR.
          1F7A  5457                    CMA                     ;CHANGE THE MASK POLARITY BY
      2F  1F7A               .BYTE      ^057
          1F7B  5458                                            ;COMPLEMENTING THE ACCUMULATOR.
          1F7B  5459                    ANA     B               ;''AND'' THE COMPLEMENTED MASK WITH
      A0  1F7B               .BYTE      ^0240 ! B
          1F7C  5460                                            ; THE REGISTER B CONTENTS.
          1F7C  5461                    MOV     M,A             ;MOVE THE MASKED EXPECTED DATA BACK
      77  1F7C               .BYTE      ^0100 ! <M*8> ! A
          1F7D  5462                                            ; INTO THE EXPECTED DATA LOCATION.
          1F7D  5463                    INX     H               ;INCREMENT THE D,E AND H,L REGISTER
      23  1F7D               .BYTE      <H*8> ! 3
          1F7E  5464                    INX     D               ; PAIRS TO POINT AT THE NEXT BYTES
      13  1F7E               .BYTE      <D*8> ! 3
```

```
                1F7F  5465                                            ; OF EXPECTED AND RECEIVED DATA.
                1F7F  5466                          RET               ;DONE
          C9    1F7F                     .BYTE      ^0311
                1F80  5467
                1F80  5468
                1F80  5469 ;*******************************************************************************
                1F80  5470 ;
                1F80  5471 ;  WCS_READ_R  THIS ROUTINE READS DATA FROM WCS AT THE LOCATION GIVEN BY
                1F80  5472 ;              WCS_ADDRESS. THE DATA IS PUT INTO THE CSR AND SHIFTED OUT
                1F80  5473 ;              INTO WCS_VALUE FOR CHECKING.  AS THE CSR IS READ, IT IS
                1F80  5474 ;              LOADED WITH A NOP INSTRUCTION.
                1F80  5475 ;
                1F80  5476 ;              THIS ROUTINE IS USED BY THE CONSOLE TESTS AND IS TAYLORED
                1F80  5477 ;              FOR FAST EXECUTION RATHER THAN VERSITILITY.
                1F80  5478 ;
                1F80  5479 ;*******************************************************************************
                1F80  5480
                1F80  5481
                1F80  5482 WCS_READ_R:      CALL     LD_UPC_R          ;LOAD UPC WITH WCS ADDRESS
          CD    1F80                     .BYTE      ^0315
       1FCC'    1F81                     .WORD      <LD_UPC_R-HEAD>
                1F83  5483                          OUT      SETSS             ;SINGLE STEP MACHINE TO LOAD
       23 D3    1F83                     .BYTE      ^0323 , SETSS&255          ;register A
                1F85  5484                          OUT      CLRSS             ; WCS CONTENTS INTO THE CSR.
       22 D3    1F85                     .BYTE      ^0323 , CLRSS&255          ;register A
                1F87  5485
                1F87  5486                          OUT      VSHIFT
       A2 D3    1F87                     .BYTE      ^0323 , VSHIFT&255         ;register A
                1F89  5487
                1F89  5488                          LXI      H,NOP_INST        ;POINT TO NOP INSTRUCTION
          21    1F89                     .BYTE      <H*8> ! 1
     00'72'     1F8A                     .BYTE      <NOP_INST-HEAD>&255 , <<NOP_INST-HEAD>&^XFF00>/256
                1F8C  5489                          LXI      D,WCS_VALUE       ;POINT TO WCS VALUE AREA
          11    1F8C                     .BYTE      <D*8> ! 1
     00'B4'     1F8D                     .BYTE      <WCS_VALUE-HEAD>&255 , <<WCS_VALUE-HEAD>&^XFF00>/256
                1F8F  5490                          CALL     MOVER_3_R         ;LOAD WCS_VALUE WITH NOP INST
          CD    1F8F                     .BYTE      ^0315
       0F5F'    1F90                     .WORD      <MOVER_3_R-HEAD>
                1F92  5491
                1F92  5492                          MVI      B,24              ;LOOP COUNT IN REGISTER B
       18 06    1F92                     .BYTE      <B*8> ! 6 , 24&255
                1F94  5493 1$:                      LXI      H,WCS_VALUE+2     ;POINT TO END OF WCS_VALUE AREA
          21    1F94                     .BYTE      <H*8> ! 1
     00'B6'     1F95                     .BYTE      <WCS_VALUE+2-HEAD>&255 , <<WCS_VALUE+2-HEAD>&^XFF00>/256
                1F97  5494                          MVI      C,3               ;BYTE COUNT
       03 0E    1F97                     .BYTE      <C*8> ! 6 , 3&255
                1F99  5495
                1F99  5496                          IN       CSR23             ;GET CSR BIT 23
       87 DB    1F99                     .BYTE      ^0333 , CSR23&255          ;to register A
                1F9B  5497                          RAR                        ;ROTATE CSR 23 INTO CARRY
          1F    1F9B                     .BYTE      ^037
                1F9C  5498 2$:                      MOV      A,M               ;MOV WCS_VALUE INTO ACCUMULATOR
          7E    1F9C                     .BYTE      ^0100 ! <A*8> ! M
                1F9D  5499                          RAL                        ;CARRY GOES IN BIT 0
          17    1F9D                     .BYTE      ^027
                1F9E  5500                          MOV      M,A               ;MOV ACCUMULATOR BACK TO MEM
          77    1F9E                     .BYTE      ^0100 ! <M*8> ! A
```

```
             1F9F  5501                    DCX     H                      ;POINT TO NEXT BYTE
       2B    1F9F              .BYTE       <H*8> ! 11
             1FA0  5502                    DCR     C                      ;DEC BYTE COUNT
       0D    1FA0              .BYTE       ^05 ! <8*C>
             1FA1  5503                    JNZ     2$                     ;REPEAT UNTIL 3 BYTES DONE
       C2    1FA1              .BYTE       ^0302
   1F9C'     1FA2              .WORD       <2$-HEAD>
             1FA4  5504
             1FA4  5505                    OUT     CLRCSR                 ;CLEAR CSR INPUT
    38 D3    1FA4              .BYTE       ^0323 , CLRCSR&255             ;register A
             1FA6  5506                    JNC     6$                     ;DON'T SET INPUT IF CARRY CLEAR
       D2    1FA6              .BYTE       ^0322
   1FAB'     1FA7              .WORD       <6$-HEAD>
             1FA9  5507                    OUT     SETCSR                 ;ELSE SET CSR INPUT
    39 D3    1FA9              .BYTE       ^0323 , SETCSR&255             ;register A
             1FAB  5508
             1FAB  5509 6$:                OUT     SETCSK                 ;CLOCK CSR TO SHIFT IT AND ALSO LOAD
    25 D3    1FAB              .BYTE       ^0323 , SETCSK&255             ;register A
             1FAD  5510                                                   ; NOP INSTRUCTION
             1FAD  5511                    OUT     CLRCSK                 ;CLEAR UPC CLOCK
    24 D3    1FAD              .BYTE       ^0323 , CLRCSK&255             ;register A
             1FAF  5512
             1FAF  5513                    DCR     B                      ;DECREMENT SHIFT COUNT
       05    1FAF              .BYTE       ^05 ! <8*B>
             1FB0  5514                    JNZ     1$                     ;REPEAT UNTIL 24 BITS SHIFTED
       C2    1FB0              .BYTE       ^0302
   1F94'     1FB1              .WORD       <1$-HEAD>
             1FB3  5515
             1FB3  5516                    OUT     VNORML                 ;RETURN TO NORMAL MODE.
    A3 D3    1FB3              .BYTE       ^0323 , VNORML&255             ;register A
             1FB5  5517
             1FB5  5518                    RET
       C9    1FB5              .BYTE       ^0311
             1FB6  5519
             1FB6  5520
             1FB6  5521 ;**************************************************************************************
             1FB6  5522 ;
             1FB6  5523 ;   WCS_WRITE_R  THIS ROUTINE WRITES DATA FROM WCS_VALUE TO WCS AT THE
             1FB6  5524 ;                LOCATION GIVEN BY WCS_ADDRESS.
             1FB6  5525 ;
             1FB6  5526 ;**************************************************************************************
             1FB6  5527
             1FB6  5528 WCS_WRITE_R:       CALL    LD_UPC_R               ;LOAD UPC WITH WCS ADDRESS
       CD    1FB6              .BYTE       ^0315
   1FCC'     1FB7              .WORD       <LD_UPC_R-HEAD>
             1FB9  5529
             1FB9  5530                    LXI     H,WCS_VALUE+2          ;POINT AT THE LOW BYTE.
       21    1FB9              .BYTE       <H*8> ! 1
   00'B6'    1FBA              .BYTE       <WCS_VALUE+2-HEAD>&255 , <<WCS_VALUE+2-HEAD>&^XFF00>/256
             1FBC  5531
             1FBC  5532                    MOV     A,M                    ;MOVE THE LOW BYTE TO WCSB0.
       7E    1FBC              .BYTE       ^0100 ! <A*8> ! M
             1FBD  5533                    OUT     WCSB0
    08 D3    1FBD              .BYTE       ^0323 , WCSB0&255              ;register A
             1FBF  5534                    DCX     H
       2B    1FBF              .BYTE       <H*8> ! 11
             1FC0  5535
```

```
        1FC0   5536                      MOV     A,M                 ;MOVE THE NEXT BYTE TO WCSB1.
      7E  1FC0                   .BYTE    ^0100 ! <A*8> ! M
        1FC1   5537                      OUT     WCSB1
   09 D3  1FC1                   .BYTE    ^0323 , WCSB1&255           ;register A
        1FC3   5538                      DCX     H
      2B  1FC3                   .BYTE    <H*8> ! 11
        1FC4   5539
        1FC4   5540                      MOV     A,M                 ;MOVE THE HIGH BYTE TO WCSB2.
      7E  1FC4                   .BYTE    ^0100 ! <A*8> ! M
        1FC5   5541                      OUT     WCSB2
   0A D3  1FC5                   .BYTE    ^0323 , WCSB2&255           ;register A
        1FC7   5542
        1FC7   5543                      OUT     SETWCK              ;WRITE TO WCS.
   37 D3  1FC7                   .BYTE    ^0323 , SETWCK&255          ;register A
        1FC9   5544                      OUT     CLRWCK
   36 D3  1FC9                   .BYTE    ^0323 , CLRWCK&255          ;register A
        1FCB   5545
        1FCB   5546                      RET
      C9  1FCB                   .BYTE    ^0311
        1FCC   5547
        1FCC   5548 ;************************************************************************************************
        1FCC   5549 ;
        1FCC   5550 ;  LD_UPC_R         THIS ROUTINE LOADS THE UPC WITH WCS_ADDRESS
        1FCC   5551 ;
        1FCC   5552 ;************************************************************************************************
        1FCC   5553
        1FCC   5554 LD_UPC_R:           LHLD    WCS_ADDRESS         ;UPC DATA
      2A  1FCC                   .BYTE    ^052
   006C'  1FCD                   .WORD    <WCS_ADDRESS-HEAD>
        1FCF   5555                      SHLD    UPC_VALUE           ;STORE DATA IN UPC_VALUE
      22  1FCF                   .BYTE    ^042
   00C2'  1FD0                   .WORD    <UPC_VALUE-HEAD>
        1FD2   5556
        1FD2   5557                      LXI     H,UPC_VALUE+1       ;POINT TO END OF UPC_VALUE AREA
      21  1FD2                   .BYTE    <H*8> ! 1
 00'C3'   1FD3                   .BYTE    <UPC_VALUE+1-HEAD>&255 , <<UPC_VALUE+1-HEAD>&^XFF00>/256
        1FD5   5558                      MVI     C,2                 ;BYTE COUNT
   02 0E  1FD5                   .BYTE    <C*8> ! 6 , 2&255
        1FD7   5559                      CALL    SHIFTER1_R          ;LEFT JUST. 15 BITS WITH COUNT
      CD  1FD7                   .BYTE    ^0315
   0EC1'  1FD8                   .WORD    <SHIFTER1_R-HEAD>
        1FDA   5560                                                  ; IN REGISTER C
        1FDA   5561
        1FDA   5562                      OUT     VSHIFT              ;SET V-BUS SHIFT MODE
   A2 D3  1FDA                   .BYTE    ^0323 , VSHIFT&255          ;register A
        1FDC   5563                      MVI     B,15                ;SHIFT COUNT=SHIFT 15 BITS
   0F 06  1FDC                   .BYTE    <B*8> ! 6 , 15&255
        1FDE   5564
        1FDE   5565 3$:                  LXI     H,UPC_VALUE+1       ;POINTER TO END OF UPC DATA
      21  1FDE                   .BYTE    <H*8> ! 1
 00'C3'   1FDF                   .BYTE    <UPC_VALUE+1-HEAD>&255 , <<UPC_VALUE+1-HEAD>&^XFF00>/256
        1FE1   5566                      MVI     C,2                 ;LOAD BYTE COUNT WITH 2
   02 0E  1FE1                   .BYTE    <C*8> ! 6 , 2&255
        1FE3   5567
        1FE3   5568 1$:                  MOV     A,M                 ;MOVE BYTE 1 LEFT
      7E  1FE3                   .BYTE    ^0100 ! <A*8> ! M
        1FE4   5569                      RAL                         ;CARRY = ROTATE IN BIT NEXT BTYE
```

```
         17   1FE4              .BYTE   ^027
              1FE5   5570               MOV     M,A
         77   1FE5              .BYTE   ^0100 ! <M*8> ! A
              1FE6   5571               DCX     H                       ;MOVE POINTER TO NEXT BYTE
         2B   1FE6              .BYTE   <H*8> ! 11
              1FE7   5572               DCR     C                       ;DEC BYTE COUNT
         0D   1FE7              .BYTE   ^05 ! <8*C>
              1FE8   5573               JNZ     1$                      ;REPEAT UNTIL 2 BYTES SHIFTED
         C2   1FE8              .BYTE   ^0302
      1FE3'   1FE9              .WORD   <1$-HEAD>
              1FEB   5574
              1FEB   5575               OUT     CLRUPC                  ;SET UPC SER IN=0 IN CASE CARRY CLR
      A8 D3   1FEB              .BYTE   ^0323 , CLRUPC&255              ;register A
              1FED   5576               JNC     2$                      ;SKIP NEXT INSRUCTION IF CARRY CLR
         D2   1FED              .BYTE   ^0322
      1FF2'   1FEE              .WORD   <2$-HEAD>
              1FF0   5577               OUT     SETUPC                  ;ELSE SET UPC SER IN=1
      A9 D3   1FF0              .BYTE   ^0323 , SETUPC&255              ;register A
              1FF2   5578
              1FF2   5579 2$:           OUT     SETUPK                  ;SET UPC CLOCK
      27 D3   1FF2              .BYTE   ^0323 , SETUPK&255              ;register A
              1FF4   5580               OUT     CLRUPK                  ;CLEAR UPC CLOCK
      26 D3   1FF4              .BYTE   ^0323 , CLRUPK&255              ;register A
              1FF6   5581
              1FF6   5582               DCR     B                       ;DECREMENT SHIFT COUNT
         05   1FF6              .BYTE   ^05 ! <8*B>
              1FF7   5583               JNZ     3$                      ;REPEAT UNTIL 15 BITS SHIFTED
         C2   1FF7              .BYTE   ^0302
      1FDE'   1FF8              .WORD   <3$-HEAD>
              1FFA   5584
              1FFA   5585               OUT     VNORML                  ;SET V-BUS TO NORMAL MODE
      A3 D3   1FFA              .BYTE   ^0323 , VNORML&255              ;register A
              1FFC   5586
              1FFC   5587               RET
         C9   1FFC              .BYTE   ^0311
              1FFD   5588
              1FFD   5589 END_CHECKSUM:
              1FFD   5590
              1FFD   5591 ;*************************************************************************
              1FFD   5592 ;
              1FFD   5593 ;         NOTE:  THE LAST ADDRESS OF THIS PROGRAM MUST NOT EXCEED 6FFF.  THE
              1FFD   5594 ;         8085 BASED MICRODIAGNOSTIC OVERLAYS LOAD STARTING AT 7000 HEX!!!!
              1FFD   5595 ;
              1FFD   5596 ;*************************************************************************
              1FFD   5597                       .END
```

```
$PSW                = 00000006              CHECK_LS_SETPAR       0000197D R     01
$SP                 = 00000006              CHECK_UPC             00001B73 R     01
A                   = 00000007              CHECK_WCS_LOADED      00000C2A R     01
ABORT_A               00000164 R     01     CLEARPAR_ERR        = 00000008
ACK_SAVE              0000017A R     01     CLEAR_CPU_ATT         0000012F RG    01
ADDR                = 00000001              CLEAR_CPU_ATT_R       00001A61 R     01
ALLOWP              = 00000003              CLEAR_DEFAULT         00000B8F R     01
APT                   00000038 RG    01     CLEAR_LS_STAT         000012D8 R     01
APTFLG              = 00000004              CLEAR_PAR_INT         000016D9 R     01
APT_C_DEF           = 000000DF              CLRACK              = 000000A9
APT_ERROR_NUMBER      00000012 R     01     CLRACL              = 00000033
APT_HARD_FLG          0000001D R     01     CLRATN              = 000000AB
APT_MAIL_BOX          00000010 R     01     CLRBSY              = 0000002E
APT_MEM_SIZE          0000001C R     01     CLRCLK              = 00000020
APT_MESSAGE_CODE      00000010 R     01     CLRCSK              = 00000024
APT_PARAM           = 00000049              CLRCSR              = 00000038
APT_PASS_CNT          00000018 RG    01     CLRDCL              = 00000031
APT_RAM_LD_ADD        00000009 R     01     CLRHLT              = 000000AF
APT_SOFT_FLG          0000001E R     01     CLRLIT              = 0000003C
APT_SUBTEST           00000014 R     01     CLRMCI              = 00000029
APT_S_DEF           = 00000020              CLRMCK              = 0000002B
APT_TEST_NUMBER       00000016 R     01     CLRPFI              = 000000AD
ASCII_1               0000017B R     01     CLRSS               = 00000022
ASCII_2               0000017C R     01     CLRTIM              = 000000A5
ASCII_3               0000017D R     01     CLRTMR              = 0000002C
ASCII_TO_BIN          00000E15 R     01     CLRUPC              = 000000A8
ATTENTION             00001321 R     01     CLRUPK              = 00000026
ATT_UPC_SAVE          000000CC R     01     CLRWCK              = 00000036
AUTO                = 00000005              CNT                 = 00000887
AUTO_TEST             00001C24 R     01     CNTA                = 00000FA7
A_ADDRS               00000163 R     01     CNTLC_TYPED           00000039 RG    01
B                   = 00000000              CNTLC_VEC             00001063 R     01
BAD_A                 0000017E R     01     CNTLP_VEC             00001070 R     01
BAD_STATUS          = 00000010              CNT_PAR               00000254 R     01
BAD_TAPE_A            00000199 R     01     COMMAND0              000000AF R     01
BEGIN_CHECKSUM        0000098A R     01     COMMAND1              000000B0 R     01
BEGIN_OF_TEST         00001881 R     01     COMMAND2              000000B1 R     01
BEG_TST             = 00000080              COMMAND3              000000B2 R     01
BELL_C_DEF          = 000000FB              COMPARE               000000CF RG    01
BELL_S_DEF          = 00000004              COMPARE_R             00000F55 R     01
BOARD_BUF             00000247 R     01     CONACK              = 00000020
BOARD_NAME            00000241 R     01     CONATT              = 00000010
BOARD_NUM             0000024D R     01     CONHLT              = 00000002
BOARD_PNT             0000024E R     01     CONSOLE_TEST          00000255 R     01
BOARD_TABLE           00000846 R     01     CONTINUE              0000003A RG    01
BOOTEN              = 00000007              CONT_COMMAND          00000B46 R     01
BOOTF               = 00000001              CONT_DONE             00000256 R     01
BYTSUM              = 00004082              CONT_SAVE_CSR         000000BE R     01
B_ADDRS               00000240 R     01     CONT_SAVE_UPC         000000C8 R     01
C                   = 00000001              CON_ADD_DAT           0000003B RG    01
CALC_ADD              00000252 R     01     CON_BEGIN_TEST        00000123 RG    01
CC_ADDR             = 000000FE  G           CON_BEGIN_TEST_R      00001EC9 R     01
CHANGE_WCS            00000C1D R     01     CON_ERROR             00000120 RG    01
CHECKSUM              00001BE9 R     01     CON_ERROR_R           00001F14 R     01
CHECK_CNTLC           00001073 R     01     CON_ERR_NUM           0000003F RG    01
CHECK_ERR_10          00000C3A R     01     CON_EXP_ADD           00000044 RG    01
CHECK_ERR_FLG         00000C3C R     01     CON_EXP_DAT           00000040 RG    01
```

```
CON_LOOP                      = 00000004                ENKCE_A                        000002CE R     01
CON_MOD_DAT                     00000046 RG    01       ENKCF_A                        000002D8 R     01
CON_MSK_DAT                     0000004B RG    01       ENKCG_A                        000002DD R     01
CON_NAME_ADD                  = 00007005                ENKCH_A                        000002D3 R     01
CON_RAM                       = 00000080                ENK_END                        0000025F R     01
CON_REC_ADD                     00000053 RG    01       EOP                            0000183E R     01
CON_REC_DAT                     0000004F RG    01       EOS                          = 00000040
CON_VER_ADD                   = 00007003                EOS_FLG                        00000056 RG    01
CPATTN                        = 00000083                ERROR                          000002E2 R     01
CPUACK                        = 00000082                ERROR_A                        000002E3 R     01
CPU_A                           00000257 R     01       ERROR_CON                      00000057 RG    01
CR                            = 0000000D  G             ERROR_ROUTINE                  00000C4A R     01
CRD_FLAGS                     = 000040FD                ERROR_ROUTINE_NO_RET           00000C45 R     01
CRD_OPT_A                       00000825 R     01       ERR_MENU                       00000D21 R     01
CRLF                            000000DE RG    01       EXECUTE                        000002EA R     01
CRLF_A                          0000025B R     01       EXEC_CONTESTS                = 00007000
CRLF_R                          0000101A R     01       EXEC_SUB                       00000B7D R     01
CSR07                         = 00000085                EXEC_TESTO                     00001BA1 R     01
CSR15                         = 00000086                EXT_A                          000002EB R     01
CSR23                         = 00000087                FAIL_A                         000002EF R     01
CSR_CNT                         0000025D R     01       FAST_WRITE                     000002FC R     01
CSR_SHIFT                       000000B7 RG    01       FILE_LOADED                    000002FD R     01
CSR_VALUE                       000000B8 RG    01       FLAGS                          0000005A RG    01
CTLDIS                        = 000040FE                FLAG_LOC                     = 00000048
C_EXECUTE                       00000250 R     01       FOUR_BYTES                     00001A29 R     01
C_RUNNING                       00000251 R     01       FPA_A                          000002FE R     01
D                             = 00000002                FPA_PRES                     = 00000010
DATA0                           000000A9 RG    01       FULL_ERROR                     0000154A R     01
DATA1                           000000AA RG    01       F_WORD                         00000058 RG    01
DATA2                           000000AB RG    01       GCVECT                       = 00004129  G
DATA3                           000000AC RG    01       GLVECT                       = 00004123
DATA_SHIFT                      000000A8 RG    01       GSVECT                       = 00004145
DATA_XFER                       00001996 R     01       H                            = 00000004
DATA_XFER_FLG                   0000025E R     01       HALT_C_DEF                   = 000000F7
DCLO                          = 00000002                HALT_S_DEF                   = 00000008
DECR_WORD                       00000135 RG    01       HAVE_CNT                       0000033D R     01
DECR_WORD_R                     000012BC R     01       HEAD                         = 00000000
DIAG_BOARD                      00000A0F R     01       HEADER_A                       00000302 R     01
DIAG_COMMAND                    00000998 R     01       HEX_0D                       = 0000000D
DIAG_CONTIN                     00000B0E R     01       HEX_1                        = 00000001
DIAG_PASS                       00000B14 R     01       HEX_10                       = 00000010
DIAG_SECTION                    00000A5D R     01       HEX_1F                       = 0000001F
DIAG_TAB                        00000960 R     01       HEX_20                       = 00000020
DIAG_TEST                       00000ACA R     01       HEX_21                       = 00000021
DIR_VECTOR                    = 0000411A                HEX_2D                       = 0000002D
DISMEM                        = 000000A7                HEX_3                        = 00000003  G
DISPAR                        = 000000A1                HEX_30                       = 00000030
DOLOOP                          00000055 RG    01       HEX_3A                       = 0000003A
DOT_A                         = 0000002E                HEX_3F                       = 0000003F
DO_COMMANDS                     0000137F R     01       HEX_4                        = 00000004
E                             = 00000003                HEX_40                       = 00000040
EMEMREF                       = 00000040                HEX_41                       = 00000041
ENBMEM                        = 000000A6                HEX_50                       = 00000050
ENBPAR                        = 000000A0                HEX_7                        = 00000007
END_A                           00000262 R     01       HEX_7F                       = 0000007F
END_CHECKSUM                    00001FFD R     01       HEX_8                        = 00000008
ENKCC_A                         000002C9 R     01       HEX_80                       = 00000080
```

```
HEX_BUF                     0000005B RG    01
HEX_FD                    = 000000FD
HEX_FF                    = 000000FF
HLTFLG                    = 00000002
IDC_A                       0000033E R     01
IDC_PRES                  = 00000080
INC_TEMPW_5                 000012A5 R     01
INC_WORD                    00000108 RG    01
INC_WORD_R                  000012B1 R     01
INITH                     = 00000035
INITL                     = 00000034
INPUT_CHAR_IF               0000105C R     01
INPUT_LINE                  0000102E R     01
INPUT_NUM                   00000676 R     01
INPUT_NUM_CHECK             00000C37 R     01
INPUT_NUM_IF                00000D9B R     01
INSTR_LEN                   00000344 R     01
INSTR_PNT                   00000345 R     01
INSTR_TABLE                 0000067A R     01
INT_CLEAR_PAR               00000BBB R     01
INVTIM                    = 00000008
ITCSR                     = 0000001D
ITDB                      = 0000001C
L                         = 00000005
LD_UPC                      00000117 RG    01
LD_UPC_R                    00001FCC R     01
LEAVE_DO                    00001B71 R     01
LF                        = 0000000A  G
LITERAL                   = 00000001
LOADER                      00000B39 R     01
LOAD_CSR                    000000F0 RG    01
LOAD_CSR_R                  00000EE7 R     01
LOAD_SECTION                00001A8B R     01
LOAD_UPC                    000000F3 RG    01
LOAD_UPC_R                  00000F19 R     01
LOOPER                      000017DF R     01
LOOPING                   = 00000002
LOOP_CNT_ADD              = 00000047
LOOP_COM_C_DEF            = 000000BF
LOOP_COM_S_DEF            = 00000040
LOOP_COUNTER                00000347 R     01
LOOP_C_DEF                = 000000BE
LOOP_S_DEF                = 00000001
LS_5                      = 00000005
LS_6                      = 00000006
LS_7                      = 00000007
LS_F                      = 0000000F
LS_PARERR_ACT               00000349 R     01
LS_SETPARERR                00000348 R     01
LVL                       = 00000000
M                         = 00000006
M1STK1                    = 00000FA6
M1STK2                    = 00000FA4
M1STK3                    = 00000FA7
MACSTK1                   = 00000887
MACSTK2                   = 00000885
MACSTK3                   = 00000881
MACSTK4                   = 00000878
MACSTK5                   = 00000879
MACSTK6                   = 0000087C
MACSTK7                   = 0000087B
MAIN_TAB                    00000931 R     01
MAKE_A                      000011AB R     01
MAKE_B                      00001195 R     01
MAKE_XD                     0000010B RG    01
MAKE_XD_R                   00001183 R     01
MAX_SBE                     0000034A R     01
MCPU_A                      00000140 RG    01
MEMORY_A                    0000034D R     01
MEM_REQ                     00000354 R     01
MENU                        00001616 R     01
MENU_A                      00000355 R     01
MFPA_A                      0000014A R     01
MICFLAG                     0000002E R     01
MICRO_STEP                  0000038A R     01
MICRO_STEPER                00001257 R     01
MICRO_STEP_CPU              00000138 RG    01
MICRO_STEP_CPU_R            000012A0 R     01
MIDC_A                      00000154 R     01
MINUS                       0000038B R     01
MINUTES_A                   0000038C R     01
MISC2                     = 00000001
MMCT_A                      00000145 R     01
MMEM_A                      0000014F R     01
MM_OR_LS                  = 00000001
MM_SIZE                   = 00000008
MOD_ERR                     00000395 R     01
MOD_NOT_PRES_A              00000396 R     01
MOD_PRES_A                  000003A6 R     01
MOD_PRES_FLG              = 00000001
MORE_DATA                   000003AF R     01
MOVER                       000000D2 RG    01
MOVER_3                     0000011A RG    01
MOVER_3_R                   00000F5F R     01
MOVER_4                     00000111 RG    01
MOVER_4_R                   00000F73 R     01
MOVER_R                     00000F75 R     01
MOV_DATA0_HEXBUF            00000F6D R     01
MOV_FROM_DATA0              00000F70 R     01
MOV_INPUT_DATA0             00000F64 R     01
MOV_LOAD_SECTION            00001A80 R     01
MR80_A                      0000015E R     01
MRL02_A                     00000159 R     01
MSK_BYTE                    00C01F78 R     01
MSK_ERROR                   0000011D RG    01
MSK_ERROR_R                 00001F31 R     01
MWCS_A                      0000013B RG    01
NA                        = 00000080
NAME_PNT                    000003BA R     01
NAME_TABLE                  0000076F R     01
NA_A                        000003B0 R     01
NA_EXP_REC                  0000005F RG    01
NA_OTHER                    00000060 RG    01
NEG_CNT                   = 00000080
```

```
NER_C_DEF           = 000000BD              PRINT_MOD_PRES_IDC    00001742 R      01
NER_S_DEF           = 00000002              PRINT_PASS            000003ED R      01
NEWSUM                000003BC R      01    PRINT_PNT             000003EE R      01
NOADD_FLG             000003BD R      01    PRINT_PROMPT          00000FD6 R      01
NOCHK               = 000040FF              PRINT_R               00001027 R      01
NOINIT                000003BE R      01    PRINT_SINGLE          000016EA R      01
NOP_CSR               000000E4 RG     01    PRINT_START           000003F0 R      01
NOP_CSR_R             00000ECA R      01    PRINT_STRING          0000010E RG     01
NOP_INST              00000072 RG     01    PRINT_STRING_APT      00001014 R      01
NOT_FOUND             000003C2 R      01    PRINT_STRING_R        0000100E R      01
NO_RETURN             000003BF R      01    PRI_STACK           = 00004080
NO_SAVE_UPC_CSR       000003C0 R      01    PRT_MOD_A             0000013B R      01
NO_SPACE              000003C1 R      01    PR_HEX_DIGIT          00000FC9 R      01
NUM_SHIFT             00000675 R      01    PWRFAIL             = 00000004
OFLAG               = 000040BB              R80_PRES            = 00000080
OKV15               = 00000007              RAM_LOAD_ADD        = 00007000
OLDSUM                000003CF R      01    READ                = 00000080
OLD_TEMP_BUF          000003C3 R      01    READJ1              = 00000003
OLD_TTBUF             000003CD R      01    READJ2              = 00000004
OPTIONAL_TST        = 00000040              READ_DATA_32          000000FC RG     01
OR_A                  000003D0 R      01    READ_DATA_32_R        000011B4 R      01
OS_ADD              = 0000007C  G           READ_LS               00000102 RG     01
OVERLAY_RAM           00000003 RG     01    READ_LS_7             00001165 R      01
OVERLAY_WCS           00000006 RG     01    READ_LS_R             00001167 R      01
PACK_ERROR            000003D5 R      01    READ_WCS              000000E7 RG     01
PACK_WARNING          0000165B R      01    READ_WCS_DATA         00001A4E R      01
PAR                   00001D6E R      01    READ_WCS_R            00000E6D R      01
PARDONE               000003D9 R      01    REMOTE              = 00000006
PARITY_CALC           00000BC8 R      01    RESET_TIMOUT          00001932 R      01
PARITY_ERR            0000193A R      01    RESTART               000003F1 R      01
PARITY_JUMP           00000061 RG     01    RESTART_CPU           0000110E R      01
PARITY_ON             00000064 RG     01    RESTORE_WR            00000C0A R      01
PARSER                00001DAE R      01    RETRY_IDC2            000003F2 R      01
PARSE_PNT             000003DA R      01    RETURN_I              00000766 R      01
PARSE_TABLE           000003DC R      01    RETURN_N              000007ED R      01
PAR_ON                000003D6 R      01    RETURN_T              00000820 R      01
PAR_TEMP_BUF          00001D6B R      01    RET_VECTOR          = 0000414D
PAR_VECT              000003D7 R      01    RL02_A                000003FE R      01
PASS_A                000003DE R      01    ROM_X_ADDRS         = 0000000B
PASS_CNT              000003EA R      01    RSVECT              = 0000413D
PERFORM_CSR           000000ED RG     01    RUNNING               00000403 R      01
PERFORM_CSR_R         000012F2 R      01    SAVED_CSR             000000BB R      01
POWER_BRANCH          00000065 RG     01    SAVED_UPC             000000C4 R      01
POWER_REC             00001C0C R      01    SAVE_WR               00000C11 R      01
POWER_SEQ           = 0000001B              SCVECT              = 00004138
PRINT                 000000D5 RG     01    SECTION_B_NUM         00000404 R      01
PRINTER               00001007 R      01    SECTION_FLAG          00C008C9 R      01
PRINT_CNT             000003EC R      01    SECTION_NAME          000008CA R      01
PRINT_CSR_VAL         00000D8C R      01    SEC_LEN             = 00000006
PRINT_FLG             00000F7E R      01    SEC_PARMB_ADD       = 00004111
PRINT_HEX             000000D8 RG     01    SEC_PARMB_DEF       = 00004150
PRINT_HEX_1           00000114 RG     01    SEC_PARMB_DST       = 00004115
PRINT_HEX_1_R         00000F94 R      01    SEC_PARMB_ERR       = 00004116
PRINT_HEX_2           00000F8F R      01    SEC_PARMB_EXT       = 0000410D
PRINT_HEX_4           00000F8A R      01    SEC_PARMB_NAM       = 00004107
PRINT_HEX_R           00000F96 R      01    SEC_PARMB_UNIT      = 00004106
PRINT_MOD_PRES        00001723 R      01    SEC_TABLE             0000085F R      01
```

```
SER_C_DEF                 = 000000EF               STEP_CNT                    00000409 R      01
SER_S_DEF                 = 00000010               STNDRD_CON                = 00000000
SETACK                    = 000000A8               STNDRD_CON_COM              0000098A R      01
SETACK_FLG                  00000405 R      01     STNDRD_CON_COM_SUC          00000991 R      01
SETACL                    = 00000032               STOP_CPU                    000010C9 R      01
SETATN                    = 000000AA               SUB_ATTENTION               00001806 R      01
SETBSY                    = 0000002F               SYM                       = 00000887
SETCLK                    = 00000021               SYMA                      = 00000FA6
SETCSK                    = 00000025               SYNTAX_ERROR                00001BE0 R      01
SETCSR                    = 00000039               S_READ_LS                   00000667 R      01
SETDCL                    = 00000030               S_WRITE_LS                  00000672 R      01
SETHLT                    = 000000AE               TABLE_MODE                  0000040B R      01
SETLIT                    = 0000003D               TABLE_PNT                   0000040C R      01
SETMCI                    = 00000028               TEMP_BUF                    0000040E R      01
SETMCK                    = 0000002A               TEMP_BYTE                   00000418 R      01
SETPAR_ERR                = 00000002               TEMP_FLAG                   0000041F R      01
SETPFI                    = 000000AC               TEMP_SECTION                00000420 R      01
SETSS                     = 00000023               TEMP_WORD                   00000419 R      01
SETTIM                    = 000000A4               TEMP_WORD1                  0000041B R      01
SETTMR                    = 0000002D               TEMP_WORD2                  0000041D R      01
SETUPC                    = 000000A9               TEST_NUM                    00000426 R      01
SETUPK                    = 00000027               TEST_NUM1                   00000427 R      01
SETWCK                    = 00000037               TEST_NUM2                   00000428 R      01
SET_ALL_TESTS               00001EBA R      01     TEST_START_A                00000429 R      01
SET_FOR_CONT                0000012C RG     01     TEST_ZERO                   00000447 R      01
SET_FOR_CONT_R              0000107B R      01     TIMER_VEC                   00001C23 R      01
SET_LS_STAT                 000012CE R      01     TIME_PNT                    00000448 R      01
SET_PARDONE                 00001C06 R      01     TIME_TABLE                  00000802 R      01
SET_PAR_INT                 000016C7 R      01     TIMOUT                      00001907 R      01
SET_SIGNALS                 00001760 R      01     TIMOUT_CNT                  0000044A R      01
SHIFTER                     000000E1 RG     01     TRACE                       0000044C R      01
SHIFTER1                    00000132 RG     01     TTBUF                       000008D1 R      01
SHIFTER1_R                  00000EC1 R      01     TTBUF_CNT                   000008D0 R      01
SHIFTER_R                   00000EB8 R      01     TTBUF_PNT                   0000044D R      01
SHIFT_L_2901                000000F6 RG     01     TTCR                      = 0000004B
SHIFT_L_2901_R              00001249 R      01     TTDB                      = 00000048
SHIFT_PNT                   00000068 RG     01     TTMODE                    = 0000004A
SHIFT_R_2901                000000F9 RG     01     TTSR                      = 00000049
SHIFT_R_2901_R              00001250 R      01     TU58_DRIVER               = 00004117
SIGNAL                    = 00000001               TUCR                      = 00000047
SINGLE_ERR                = 00000004               TUDB                      = 00000044
SKIP_CNT                    00000406 R      01     TUMODE                    = 00000046
SKIP_TEST                   0000006A RG     01     TUSR                      = 00000045
SKIP_TO_SPEC                00000E33 R      01     TYPE_CHAR                   00001027 R      01
SLVEC1                    = 00004133               UBE_PRES                  = 00000040
SLVECT                    = 0000412E               UBS_BUSY                  = 00000040
SPACE                       000000DB RG     01     UBS_DC_LO                 = 00C00020
SPACE_A                   = 00000020               UBS_INIT                  = 00000010
SPACE_R                     00001021 R      01     UPC14                     = 00000084
SPBUFF                    = 00004086               UPC14A                    = 00000000
SPECIAL_C_DEF             = 0000007F               UPC_COMPARE                 000000CA R      01
SPECIAL_S_DEF             = 00000080               UPC_SHIFT                   000000C1 R      01
STARTING_UPC                00000407 R      01     UPC_SUB                     000000C6 R      01
START_CPU                   000010FF R      01     UPC_VALUE                   000000C2 RG     01
START_CPU_COM               00001123 R      01     VERIFY_SEQ                  000018A1 R      01
START_UP                    00001CD2 R      01     VERIFY_WRITER               00001B16 R      01
STATUS                    = 00000040               VERSION                     0000044F R      01
```

```
VERSION_1                         00000631 R       01     WRITE_DATA_32                     000000FF RG     01
VNORML                          = 000000A3                WRITE_DATA_32_R                   000011D2 R      01
VSHIFT                          = 000000A2                WRITE_LS                          00000105 RG     01
WARM_RESTART                      000004B3 R       01     WRITE_LS_R                        00001146 R      01
WARN_MESA                         0000059A R       01     WRITE_LS_STAT                     000012DF R      01
WARN_MESB                         000005C8 R       01     WRITE_TAB                         00000921 R      01
WARN_MESS                         000004B4 R       01     WRITE_TAB_PNT                     0000006F RG     01
WCSB0                           = 00000008                WRITE_WCS                         000000EA RG     01
WCSB1                           = 00000009                WRITE_WCS_R                       00000E8A R      01
WCSB2                           = 0000000A                WRONG_LAB                       = 00000020
WCSERR                          = 00000001                XD_ADDRS                          00000071 RG     01
WCS_A                             00000585 R       01     XFER                            = 00000020
WCS_ADDRESS                       0000006C RG      01     XFER_CNT                          0000058D R      01
WCS_ADDR_DAT                    = 00000044                XFER_DEST                         0000058F R      01
WCS_BAD_PARITY                    0000006E RG      01     XFER_MM                           00000592 R      01
WCS_CALC                          0000058A R       01     XFER_PNT                          00000593 R      01
WCS_CL_FIFO                     = 00000062                X_CLR_CPU_ATT                     0000066A R      01
WCS_DAT_32_ADD                  = 00000600                X_CLR_PAGE                        0000007D RG     01
WCS_DE_DBUF                     = 00000061                X_CLR_WR0                         000000A1 RG     01
WCS_DE_ICSR                     = 0000005F                X_COM_WR0                         000000A5 RG     01
WCS_DE_IDAR                     = 00000060                X_MOV_WRWR                        0000009E RG     01
WCS_DE_MCT                      = 00000050                X_READ_LS                         00000663 R      01
WCS_DE_MM                       = 00000054                X_ROT_L                           00000079 RG     01
WCS_DE_TB                       = 00000052                X_SET_PAGE                        00000081 RG     01
WCS_DE_UBS                      = 00000058                X_SHIFT_L                         00000075 RG     01
WCS_ERROR                         00001442 R       01     X_SHIFT_R                         00000085 RG     01
WCS_ERR_NUM                     = 00000041                X_WRITE_LS                        0000066E R      01
WCS_EXP_DAT                     = 00000042                Y                               = 00000055
WCS_EX_DBUF                     = 0000005C                YBUSRD                          = 000000EC
WCS_EX_ICSR                     = 0000005A                ZERO_BYTE                         00000595 R      01
WCS_EX_IDAR                     = 0000005B                ZERO_WORD                         00000596 R      01
WCS_EX_MCT                      = 00000051
WCS_EX_MM                       = 00000055
WCS_EX_PATT                     = 0000005D
WCS_EX_POSIT                    = 0000005E
WCS_EX_TB                       = 00000053
WCS_EX_UBS                      = 00000059
WCS_FILE_NAME                   = 00000607
WCS_LOADED                        0000058B R       01
WCS_LOAD_ADD                    = 00000000
WCS_MOD_DAT                     = 00000046
WCS_MSK_DAT                     = 00000045
WCS_PNT                           0000058C R       01
WCS_READ                          00000126 RG      01
WCS_READ_R                        00001F80 R       01
WCS_REC_DAT                     = 00000043
WCS_REST_WR                     = 00000057
WCS_SAVE_WR                     = 00000056
WCS_SEL_FIFOA                   = 00000063
WCS_SEL_FIFOB                   = 00000064
WCS_SHIFT                         0000006B RG      01
WCS_VALUE                         000000B4 RG      01
WCS_VAL_SHIFT                     000000B3 RG      01
WCS_VER_ADD                     = 00000606
WCS_WRITE                         00000129 RG      01
WCS_WRITE_R                       00001FB6 R       01
WRITE                           = 000000CC
```

```
                                        +-----------------+
                                        ! Psect synopsis !
                                        +-----------------+

PSECT name                   Allocation          PSECT No.  Attributes
----------                   ----------          ---------  ----------
.  ABS  .                    00000000  (    0.)  00 (  0.)  NOPIC   USR   CON   ABS   LCL NOSHR NOEXE NORD  NOWRT NOVEC BYTE
MICMON                       00001FFD  ( 8189.)  01 (  1.)  NOPIC   USR   CON   REL   LCL NOSHR   EXE   RD    WRT NOVEC BYTE

                                      +--------------------------+
                                      ! Performance indicators !
                                      +--------------------------+

Phase                    Page faults    CPU Time        Elapsed Time
-----                    -----------    --------        ------------
Initialization                   104    00:00:00.50     00:00:03.94
Command processing               119    00:00:00.50     00:00:03.67
Pass 1                          3277    00:01:01.88     00:06:38.08
Symbol table sort                 13    00:00:01.33     00:00:04.92
Pass 2                          3729    00:00:25.50     00:01:47.52
Symbol table output               92    00:00:00.60     00:00:03.89
Psect synopsis output             13    00:00:00.01     00:00:00.07
Cross-reference output             0    00:00:00.00     00:00:00.00
Assembler run totals            7354    00:01:30.34     00:08:42.09

The working set limit was 500 pages.
620993 bytes (1213 pages) of virtual memory were used to buffer the intermediate code.
There were 40 pages of symbol table space allocated to hold 658 non-local and 219 local symbols.
7627 source lines were read in Pass 1, producing 65 object records in Pass 2.
151 pages of virtual memory were used to define 150 macros.

                                     +----------------------------+
                                     ! Macro library statistics !
                                     +----------------------------+

Macro library name                       Macros defined
------------------                       --------------
SYS$SYSROOT:[SYSLIB]STARLET.MLB;1                0

0 GETS were required to define 0 macros.

There were no errors, warnings or information messages.

MACRO/SHOW=(BIN)/LIST=ENKAB.LIS/OBJECT=ENKAB.OBJ 8085MAC.MAR+MACDEF.MAC+ENKAB.MAC
```

```
Fiche   Frame   Sequence
  1      B1        1     Documentation
  1      E1        4     Map
  1      H1        7     .MAIN.                                  14-JUN-1984
  1      D15     185     Symbol table                            14-JUN-1984
  1      J15     191     Psect synopsis                          14-JUN-1984
```